

COAL AGE

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No. 6

Arnold Bennett, the famous English author, who recently made a short visit to the United States, has been writing his impressions of us for one of the leading monthlies. One of these articles contains the following:

"What strikes and frightens the backward European almost as much as anything else in the United States is the efficiency and fearful universality of the telephone."

Mr. Mine Operator, do you think that sentence is equally applicable to the telephone service in the average American coal mine? We think not. But if not, why not?

We'll let you answer that if you can. We've heard plenty try to give a reason but, frankly, we are still in the dark.

If you reverse the question and ask why telephones should be "fearfully universal" in and about our coal mines, every man in or out will give you a prompt and reasonable answer. But if you press the matter a little further, you'll probably find that your informer is a little hazy as to what constitutes efficiency in telephone practice.

We once heard an operator expatiating on the efficiency and dependability of his mine-telephone system. A few weeks later circumstances led us to make a trip through one of his mines and out of curiosity, we investigated the telephone system. Here is what we observed.

The mine consisted of a main slope with long right and left headings turned off at regular intervals. Some of these headings were several miles in length, and they were served with electric haulage locomotives.

The telephone system underground consisted of three phones: one at the first pair of entries, one about midway down the slope and one near the face of that roadway.

When the locomotives were at the mouths of these entries waiting on empties, the motormen were within hearing distance of these phones. When they were in-

side gathering trips, the phone bells were useless. If you think this is an extreme case, begin to observe if you please, how few mine phones are within hearing distance of a regular worker, who could be depended upon to hear the telephone signal bell.

In an office building the boss who can't so regulate his affairs as to be within hearing distance of his telephone every minute of the day feels justified in employing an office girl to assume such service; if he has a few assistants scattered around in adjoining rooms, he supplies each of their desks with phone extensions and push buttons and bells. He could summon any of these subordinates by simply opening a door and beckoning, but why do that when the phone saves even these few steps?

In our friend's coal mine, to summon an assistant requires the following operation: Ring, ring, ring, until someone happens to answer. Then order that someone to go to the face of one of these cross-entries (a matter of possibly one mile), as the assistant reported earlier in the day that he expected to be there. Perhaps he'll be found there, perhaps not.

In case of fire what chance would the workers at the face have if their escape depended upon some one traveling a mile to warn them?

A large coal-mine organization which has once become accustomed to an efficient telephone system would no more be able to operate without it, than a train despatcher be able to handle his trains without keeping in touch with them by wire. This comparison may seem a little exaggerated at first blush, but a little consideration will overcome such an impression.

The train despatcher has a fixed number of trains operating on a fixed schedule and passing at fixed passing points; he would not *require telegraph communication* with them if the schedules were always maintained—how often are they maintained as a matter of fact?

How often are the mine foremen and his assistants able to carry out an entire day's work according to a previously arranged schedule?

IDEAS AND SUGGESTIONS

Co-operation

By E. L. COLE

Those of us who are employed in the coal-mining industry are continually having the cry of economy dinned into our ears, until it forms a part of our very being. There is also the demand for the elimination of wasteful methods. And our superiors have provided elaborate accounting methods, so that we are at all times confronted with statements, proving that the cost of production is one that requires constant vigilance on the part of all, to insure maximum results with minimum expenditures.

But there is one phase of this problem, whereby the cost of production is enhanced, though even the most elaborate system of accounting fails to show the large losses thus sustained. This is the lack of thorough co-operation between the heads of the various departments.

Too often the men who are charged with the management of departmental work are prone to guard with zealous care, what they are pleased to term "the encroaching on their territory," by the heads of other departments. They frequently remark, in the presence of subordinates, their opinion of the offender, and there rises a wall of antagonism, high and wide, between those who are supposed to work together for the interests of their employer.

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Moreover, we see the subordinates infused with a hostile feeling toward the other departments, and there is a total absence of the *esprit de corps*, with the result that there is a marked falling off in the efficiency of the entire organization.

It is not necessary for me to cite instances of this lack of coöperation, where heads of departments are prone to stand on their so called "dignity." The reader needs only to study conditions in his own department and, if he is candid, he will often be obliged to admit that the absence of discipline is but the reflex of his own attitude toward the heads and employees of other departments.

Troubles in industrial work are nearly always due to the sins of omission, or commission, of the department head who is most prone to stand on his "dignity," and who is first to take offense when he meets the head of another department "trespassing" on what he considers his "private domain."

Have you clearly and forcibly impressed on the minds of your employees that their salary, as well as that of all others, is payment for services rendered to the same employer? And that to be guilty, even in a small measure, of refusing to coöperate with your fellow employees is nothing short of larceny? Is in fact receiving money under false pretense.

Concerning Conservation of Coal

By CARSON W. SMITH*

Has it ever been proposed that the state should tax a coal company for coal left and rendered inaccessible in a mine? Suppose for instance that some state took the notion that it was trustee to posterity for the coal within its boundary, and said to the coal-mining man:

"Now, friend, we have come to the conclusion that you can do differently and a lot better with these mines of yours. We don't like the way in which you are gouging out the best and cheapest portions of our coal, leaving so much that is totally and forever lost. We don't believe you have the right to spoil what will be so valuable and necessary in just a few years, and we are going to try to find a way so you won't want to do this.

"So we are going to tax you for what coal you don't get! That is, of course, within certain reasonable limits. If you lose coal in your mine, you are destroying this state's wealth, and so you will pay back what you have lost for us. And if you can't operate your coal mine under these conditions and make money, *then your mine never should have been opened*, and this will compel you to close down until such a time that coal will be worth more money to us and we can pay you such a price for it that you can afford to fulfill our conditions!"

The amount of coal left and ruined each year in the mines of this country must be appalling. It is certainly

unfortunate, and to a large extent unnecessary. This loss, however, will continue to be excessive just as long as the present economic conditions of the coal business continue.

No man, just for the love of humanity, is going to get out coal that costs him more than he can sell it for. When he encounters such coal in his mine he is going to leave it there—and this coal generally is in such shape that its future recovery is impossible, and if it is not taken out with the rest, it is gone forever. This is good enough for the operator, as it cuts down his average cost and enables him to make more money than he otherwise would. It is good enough for the consumer, as he gets cheaper coal—for the time being.

Who was it said, "After us, the deluge!"? Is not this our attitude?

A sinking fund is good policy in most any business. Would it be amiss for the people of this state to curtail their profits to a slight degree, so that their business might be greatly prolonged? Real patriotism is not in living only for ourselves and for today—or even for our children just for tomorrow. Practical conservation, I take it, is a real patriotism, indeed. It is as intimately associated with the future welfare of the nation, as preserving the integrity of this republic. And a great many strong men have offered up their lives to the future of

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this United States. We, today, scarcely think of conservation as being so serious a matter.

Could a state administer successfully a law imposing a tax of 15c. a ton on all coal lost, destroyed and rendered unavailable by the operating company? Would it be impracticable, unwise and unconstitutional to do so? Possibly.

One can plainly see, however, what would be some of the results in the coal world from such a measure. First probably, the price of coal would go up. Later on certain mines would shut down. The coal production of the whole country would decrease to the resulting economic balance.

In the coal mines, operators would begin to spend money to make their mines fireproof and explosion proof and trouble proof. And they would begin to get out all the coal—within what the law considered reasonable. Instead of seeing ten million tons in a property, the owner would see fifteen million tons, and he would build accordingly. His men would live in better houses. They would work under safer conditions. They would have instructions in careful mining, and as their skill grew, so would their pay. And, above all, no longer would they work for their bread in daily danger of their lives, for disaster to them spells ruin to the company!

The price of coal would go up—and the public would pay for it. Why, God bless them, of course they would pay for it!

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The Value of Discipline

BY A PENNSYLVANIA ENGINEER

Nearly every time we pick up a table of statistics giving the death rate per thousand tons of coal mined and the rate per thousand men employed, we are sure to see a parallel column comparing the United States unfavorably with other coal-producing countries. Among the reasons why this is so, is the fact that a more strict discipline is enforced in the foreign countries than in our own coal-mining operations. Discipline is, by all odds, one of the most important factors in the safe operation of a coal mine; and this means discipline not only for the mine workers, but also for the officials, of whatever standing they may be.

Not so very long ago, the worth of a miner was judged by the time in which he cut his coal and loaded his quota of cars for the day. Haste to finish the shift, however, nearly always entails a haste in which there are apt to be infractions of the mine rules and the mine laws which mean increased danger, not only to the offending miner, but also to his neighbors.

How often do the foremen and firebosses, in their daily examination of the workings, find little infractions of the law which may lead to serious consequences, and pass the matter over with a slight reproof? Frequently the miner is found making a cartridge with a lighted lamp on his head, instead of keeping his light five feet away. He is not discharged, as he should be, but is given a lecture and the next time probably does the same thing. The foreman excuses himself for not inflicting a more serious punishment by saying that if the man were discharged, he would find work immediately in a near-by colliery, and as men are needed in his own mine, he might as well keep him.

Often the foreman, in walking through the mine, finds

something wrong with the air current, and on investigation, finds that the "nipper" or doorboy has left his place and gone in on a trip with the driver, leaving the door open, as he expected to be gone but a short time. Does the foreman discharge him? Very seldom; he needs doorboys, and the next one would probably do the same thing. So the boy is let off with a reprimand, and threatened with dismissal if the offense is repeated. Such things do not make for a good standard of discipline, and thus go far toward rendering the mines more unsafe than they would be if all rules were enforced.

Nor is the trouble wholly with the workmen. The foreman, in a hurry to go from one section to another, will ride up a slope in a mine car, instead of having the man-cars put on; or he will ride on an electric or air motor; either of which acts would be severely censured if perpetrated by a workman. And yet, how can he expect the miners to wait for the man-cars, or to walk a long, roundabout manway, when they see him travel in the mine cars?

The strict discipline existing in European mines is one of the reasons for the decreasing death rate, even though the working conditions are said to be more dangerous than in this country. We must, then, enforce strictly both the mine laws and the special rules of our collieries, and make the men, of all classes, understand that any deviation from these rules means instant dismissal.

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Cutting the Price of Coal

BY A PENNSYLVANIA INSPECTOR

We are often surprised to find that men, as intelligent as the coal operators of the present day, are continually underselling one another; in fact, cutting each other's throats. Every person interested is asking someone to explain how he can make a fair profit on his investment.

If these same operators would give the matter just one hour's thought, each and every one would arrive at the same conclusion; namely, that all coal must be sold at a standard price which will give everyone the fair profit for which they are continually clamoring. This can never be accomplished as long as coal is sold at the mine. There must be a fixed price for the different grades of the product at every market place.

If one concern has all the necessary timber on its property to operate its plant and can probably save two or three cents on props and mine ties, it is so much to its advantage, and means so much more profit on each ton of coal mined, if coal is sold at a fixed price.

Other operators are interested in steel mills. They figure that they can get their rails at a lower cost than other coal companies. This is all well and good—but instead of making that profit—the difference in cost of steel paid by them and the other company—they sell their coal just that much cheaper and the others must do likewise. Then they wonder why the price of coal is not higher.

It is all up to you, Mr. Operator. It is you who must get busy. You cannot look to some outsider to drop in and show you how to run your business. Do you realize that there would be just as much coal consumed if the prices were three or four times what they are at present? The operators must get together; they, and they alone, can remedy the low prices.

The Bering River Coal Field, Alaska

By W. R. CRANE*

SYNOPSIS—The Bering River coal field is shut in by high ranges of mountains and large glaciers. It only covers 69 square miles, but the total thickness of the beds in the Carbon Mountain district is 75 ft. and in some parts of Cunningham Ridge it may be equally thick. The folding and faulting are considerable and the volatile content changes rapidly from east to west.

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The Bering River coal field lies north of Controller Bay and the Bering River, and extends some 20 miles in a northeasterly direction from Bering Lake on the west to the Bering Glacier on the east and south. The Martin River Glacier and the Chugach Mountains lie to the north of the field. The accompanying map gives the position of the prospected areas in which coal has been found, which is of good grade and in beds of sufficient thickness to warrant working. See Fig. 1.

COAL IN COLD STORAGE

The coal field is practically surrounded by lofty, snow-clad mountain ranges and extensive fields of glacial ice. It is but natural then that the climatic conditions should be affected to a marked degree by the close proximity of such vast ice-bound areas. An annual precipitation, approaching 150 in., is not uncommon, and this is practically equally divided throughout the year, although the summer months are probably somewhat drier than the other seasons.

The field is practically isolated from the interior by the glaciers and rugged mountain ranges, which isolation is so complete that moose, caribou and deer are not to be found here, and the smaller animals and birds are decidedly limited in variety.

The Chugach Mountains, lying to the north of the coal field, have elevations of 6000 to 12,000 ft., and increase in height as they approach the coast, while the mountains lying within the field seldom attain a height of more than 2000 ft., although occasionally isolated peaks have elevations of 2500 to 4000 feet.

Mountains of moderate elevation rise abruptly from the flats and lowlands of the Bering River, and are cut by cañons in which both swift mountain and glacial streams are actively at work cutting the gorge deeper and wider. Erosion is much more active below timber line than above, due largely to the protection that the rock masses receive from the moss which covers the mountains.

Spruce and hemlock are abundant but seldom reach a greater elevation than 1000 ft., which is the normal timber line. Above timber, the mountains are covered with a mantle of moss and small plants, also in many places with thickets of low bushes. Many flats or parks on the summit of the mountains produce luxuriant growths of low grass, which might furnish excellent feed for animals were it not for the exceedingly wet and marshy condition of the soil.

The average temperature for this region is below 50 deg., ranging from 2 deg. to 84 deg. above zero. Were it

not for the excessive rainfall, it would be possible to carry on mining operations the whole year round. While there is occasionally a heavy fall of snow, which would seriously interfere with cutting and handling timber and performing other outside operations, yet there are many seasons when the fall of snow would be of no consequence.

ONLY 69 SQUARE MILES OF COAL LAND

The total area of the Bering River region does not exceed 430 square miles, of which 69 square miles are underlain with coal or at least consist of coal-bearing forma-

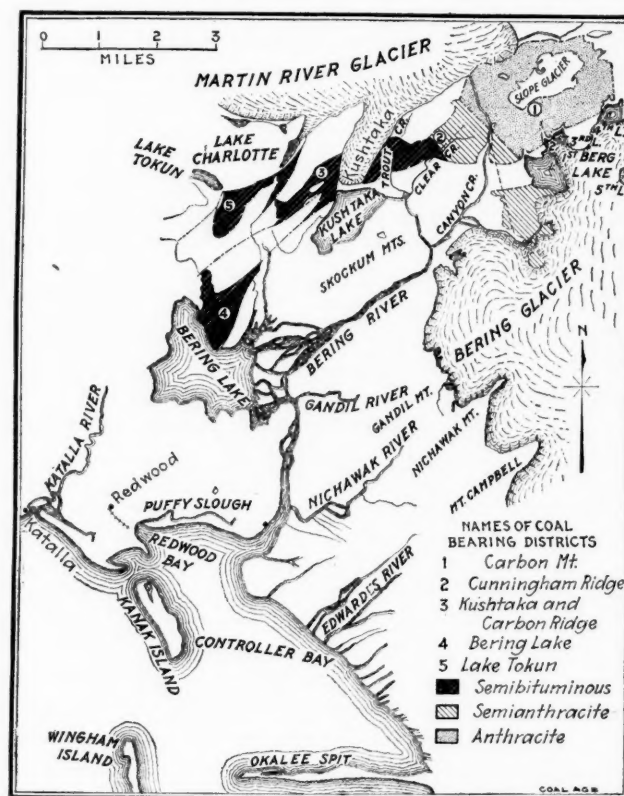


FIG. 1. PLAN SHOWING THE BERING RIVER COAL FIELD AND ITS RELATION TO THE COAST LINE

tions. While the coal-bearing area is gradually being extended it is not probable that there will be any material additions made.

According to Dr. G. C. Martin¹, the area containing coal can be subdivided into definite parts according to the character of the fuel found. The anthracite and semi-anthracite coal are distributed over 26.6 square miles, semibituminous over 20.2 square miles and there is an area of 21.6 square miles probably underlain with coal, although the coal-bearing formations do not appear on the surface.

While the existence of coal in the Bering River field was known at an early date to the Indians and possibly to the Russians, definite knowledge regarding it does not seem to have become known until 1898, when R. A. Johnson, of California, learned of it from the Indians while investigating the oil resources of Yakutat Bay and the re-

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U. S. G. S., Bull. No. 335, p. 65.

gion about Katalla. Considerable prospecting was done, and the Alaskan Commercial Co., now the Alaska Development Co. was formed, being interested in both oil and coal. The coal on Kushtaka Ridge was located by this company.

HEAT FROM IGNEOUS ROCKS HAS DEVOLATILIZED THE COAL

For convenience of discussion, the coals of this field will be considered according to location rather than character, although the kind of coal will be carefully designated for each particular locality. The five areas into which the coals of this field may be grouped are: Carbon Mountain, Cunningham Ridge, Kushtaka and Carbon ridges, the Bering Lake district, and Lake Tokun district. The order of these fields is from east to west, which is also the order of the occurrence of the different kinds of coal; namely, anthracite, semianthracite and semibituminous.

It is somewhat difficult to explain why there should be such a wide divergence in character of coals as is found

That part of the field occupied by Carbon Mountain is several hundred feet higher than the other parts. It is capped by a large mass of snow and ice, known as a "slope glacier." There is probably no part of the Bering River field which has been more thoroughly and systematically prospected.

The northern portion and the greater part of Carbon Mountain contains beds of anthracite coal, while there are a number of isolated portions in the southern extension of the mountains containing semianthracite. It is probable that coal will ultimately be discovered on all parts of the mountain, for the area is constantly being extended by careful prospecting.

It is extremely difficult to estimate the number of coal beds occurring on Carbon Mountain, owing to the shape and the exceedingly irregular surface formed by the enormous streams diverging radially from the summit and fed by the capping of ice, also due to the ever-changing dip and strike of the strata. While it is not impossible to correlate the coal beds from the top to the bottom of the mountain from data obtained through examination of outcrops, yet it would be very difficult and has not been attempted.

SEVENTY-FIVE FEET OF COAL ON CARBON MOUNTAIN

It is not difficult, however, to obtain an approximate estimate of the aggregate thickness of coal beds occurring at or near the base of the mountain. As Canyon Creek is approximately straight, a line of sectioning could be taken paralleling that creek. Such a line would be nearly normal to the strike of the majority of the coal outcrops thus preventing the repetition of coal beds unless a fold was cross, in which case the fact would be evident from reversal of dip.

From all information available, it is safe to say that there are 65 ft. of semianthracite and 10 ft. of anthracite, or a total of 75 ft. of workable coals at present located along the lower part of the mountain and in this direction.

Maps of this mountain show a large number of outcrops, many of which are evidently on the strike of the same bed of coal, while others, which appear to be on other beds, may be upon the same, due to a change in direction of strike as a result of folding. Further, many outcrops located are of beds too small to be of any commercial value. There are, however, a number of coal beds on this mountain that range from 6 to 20 ft. in thickness, which have not been located at the base of the mountain.

CUNNINGHAM RIDGE DISTRICT

The Cunningham Ridge is about equally divided between the semianthracite and the semibituminous coals, the former area being at the east end of the field. The semianthracite area has undergone extensive folding, as is shown by the condition of the strata on the wall of the cañon facing Canyon Creek. See Fig. 2. From the summit to the base of the mountain the strata have been so folded and faulted that it is practically impossible to trace the separate beds continuously for even half a mile. The dip of the strata is constantly changing from north to south. Under such conditions, particularly when accompanied by cross-folding and faulting, it is practically a hopeless task to attempt to secure definite information regarding the number of workable coal beds. Conditions are, however, not so bad a mile or two to the westward, and more definite information can be secured.



FIG. 2. SOME BADLY DISTURBED COAL IN THE CUNNINGHAM RIDGE DISTRICT

in the two extremes of this field, particularly if the explanation is based on supposedly greater intensity of earth movements. Dr. Martin¹ holds that the rocks of the anthracite region have been more closely folded, while those of the bituminous areas have more or less open folds, the structure being simpler.

To the writer a more plausible explanation is that the anthracite coals were close to igneous masses and in certain instances were even in actual contact with igneous intrusions now forming sills and dikes. These, though small, are evidence of the comparatively close proximity of larger masses of igneous materials. Further, there are localities in the heart of the bituminous area, which have undergone fully as extensive folding and faulting as any part of the anthracite area, and yet the coal retains its bituminous character. This matter will be referred to again under the head of occurrence of coals both in this and the Matanuska fields.

No estimate of the quantity of coal available for mining in this field will be attempted in this connection, owing to the fact that the coal beds in many localities exhibit a tendency to be quite variable in thickness and any estimate based on the assumption that a uniform bed will be maintained for a given depth or area covered by the seams will be of little value until more definite information is available.

¹U. S. G. S., Bull. 335, p. 91.

Clear Creek extends in a northeasterly direction from Kushtaka Lake and cuts through the center of the productive area of the semianthracite field. Passing up this stream, non-coal-bearing formations are first crossed over, then a small extension of the semi-bituminous area is encountered, in which a 4-ft. bed of coal outcrops. Continuing up the bed of the creek, the gorge becomes deeper and the outcropping of coal beds can readily be observed. It is not, however, until an elevation of about 650 ft. is reached that coal is found in any considerable quantity. Between elevations 650 and 800 ft., and for several hundred feet along the course of the creek, extensive beds of high-grade coal occur, standing at inclinations varying from 40 deg. to 67 deg. with the horizontal.

IRREGULARITIES WHICH MAKE ESTIMATION DIFFICULT

Here again a serious difficulty arises, rendering the estimation of footage of coal beds very uncertain. At the locality where the largest amount of coal occurs, a fault has displaced the beds; the creek following the strike of the fault for considerable distance. The direction of displacement is not vertical but makes an angle of about 45 deg. with the vertical, thus the coal beds, while occurring on both sides of the creek, are not continuous, and one must cross and recross the stream, often going a distance of several hundred feet, up or down stream, in order to examine the outcrops.

In estimating the number of coal beds in this locality, those on one side of the creek alone should be taken into consideration, those on the other side ignored. The objection that might be raised to this method of procedure is that the bed on one side is 40 ft. thick, while that on the other side is only 17 ft. It is doubtful, however, that the 40-ft. bed will maintain this width. It has probably been thickened or massed by the movement of the strata that accompanied the faulting—a contention that seems to be borne out by examination of apparently the same bed outcropping at a point several hundred feet up the mountain and evidently in line with the strike of the 40-ft. bed.

If this is correct the coal in this locality resolves itself into practically a 17-ft. bed. Several thinner beds of coal occur at or near the source of Clear Creek and almost on the summit of the mountain. The aggregate thickness of coal beds as observed along the line of Clear Creek is therefore 21 ft., of which 4 ft. is semi-bituminous.

Passing to Trout Creek, which traverses the western portion of the Cunningham Ridge, a number of outcrops of excellent coal are to be found, which aggregate some 55 ft. in thickness.

The high ridge extending in a southwesterly direction from Monument Mountain and forming a divide between Trout and Clear Creeks, also contains a number of large outcrops, which, as in the case of the Carbon Mountain, have not been traced to a lower level. The ridge is quite narrow, is practically devoid of vegetation, and it is, therefore, an easy matter to make observation on the occurrence of existing coal beds. From north to south, seams of coal of the following thickness were noted: 3 ft., 38 ft., 31 ft., 3 in., and 3 ft., making a total thickness of 75 ft. within a distance of less than a fourth of a mile. The coal beds of the western portion of this district stand at angles varying from a few degrees even up to the vertical.

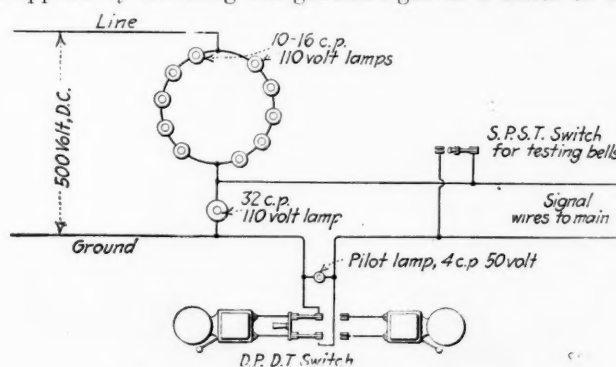
(To be continued in an early issue)

A Simple Electric Mine Signaling System

BY JOSEPH DANIELS*

The accompanying sketch shows a simple, economical and dependable system of electric signaling. The current for lighting, pumping, underground and surface haulage is 550 volts, d.c. This current is utilized for signaling purposes in the manner to be described. No. 12, B. & S. galvanized-iron wire is carried down the slopes and suspended from small porcelain knobs on plugs driven into the roof or fastened to posts on the side. These wires are also carried into each level or gangway and a double-pole switch is provided at each level to cut out the signal wires below that point.

In the engine room the current to operate the gongs is supplied by shunting the ground light of a series of ten



LAYOUT FOR SIGNALING SYSTEM

16-cp., 110-volt lamps, as indicated in the diagram. Two series of lights are in the lamp bank rheostat, thus providing for accident in case one series should burn out. Two bells, a pilot light, and a testing switch are installed on a board in front of the hoisting engineer. The bells are so arranged that either one may be used, in case the other is out of order, by simply throwing the handle of a double-throw, double-pole switch. The pilot light is connected in parallel with the bells and burns brightly at each signal, thus acting as a substitute in case the bell fails to ring. The single pole switch, connected with the signal wires to the mine, permits the engineer to test the signaling system from his station. Signals from the mine are sent by short-circuiting the wires in the slope. This is done by means of a copper spanner of ample width, so that the trip runner can close the circuit without having to get off the trip or grasp the signal wires in his hands.

The system does not require much labor, expensive apparatus or material to install, and its maintenance amounts to practically nothing. In case of any trouble in the mine, short-circuits or broken wires can be easily located and quickly repaired.



The U. S. Geological Survey classifies land as coal land only when the coal lies at what is now considered a depth minable in this country. The character of the coal determines the depth to a certain extent. The higher grade coals are allowed a maximum depth of 3000 ft., less is allowed for poorer grades. Lands underlain with coal at a depth of 3500 or 4000 ft. are classed as "non coal" lands. The amount of coal below 3000 ft. has not yet been estimated, but it is without doubt large. The coal above this depth is estimated by the Geological Survey to be 2000 billion tons. Less than 11 billion tons have been mined. A large part of the estimated 2000 billion tons consists of comparatively low grades of lignite

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Our Future in the Export Trade—II

BY F. R. WADLEIGH*

SYNOPSIS—*The second of the series on this important subject. This installment is confined entirely to a study of British coals, methods of mining, quality, transportation and marketing conditions. Satisfactory analyses of the British product, the only serious competitor of the American fuels, are difficult to obtain.*

A distance of from 20 to 30 miles is all that intervenes between the Welsh mines and the tidewater shipping ports; in fact, nearly every coal field in Great Britain is within that distance. This would seem to give the Welsh coals an immense advantage in transportation over the American product with their 300- to 400-mile haul, part of it through a mountainous country. This advantage is entirely overcome, however, by the efficiency of the American coal roads and their ability to handle immense tonnages at low costs.

SOUTH WALES COALS

There has been so much loose talk and so many incorrect and misleading statements made in the United States trade papers, regarding Welsh and Cardiff coals that it is advisable to give some information regarding them, the beds from which they are mined and the different qualities of each.

There are different kinds and grades of Welsh or "Cardiff" coals and to lump them all together for purposes of comparison, as has been frequently done, would be about the same as putting all the Pennsylvania and West Virginia products in the same class. In speaking of the Cardiff coals, it should be noted that some of those from other ports, Swansea, Newport and Port Talbot, are also of first-class quality. In addition to these there are also many other coals in Great Britain that enter the export markets and with which United States coals must come into competition, some of them being nearly equal in quality to the best Welsh product.

Let us first consider the British export tonnage and see how much of it is Welsh coal. The total exports from Great Britain, in 1911, amounted to 64,599,266 long tons, valued at \$170,944,298.80, or an average of \$2.646 per ton. Of this total, 16,127,000 tons were exported from Cardiff and 8,743,000 from the other three British channel ports, so that 24,900,000 tons may be taken as the annual total exports of Welsh coal, leaving out the small ports, Llanelly, Neath, etc. Of this total about 8,000,000 tons goes to countries where we can never compete, because of geographical and transportation reasons. Of the total British exports about 37 per cent. comes from South Wales.

This leaves 16,000,000 tons for the United States coals to displace, as far as they can do so, an uphill task and one that has not yet been properly started. An old Spanish proverb will apply here: "In scratching and eating, everything is in the beginning." Currents of export trade once well started, gather volume as they move and have settled channels. Our attempts on this export market have been spasmodic and unsystematic; we must overcome a bad beginning and do our best to reverse or change the trade channels.

The South Wales Coal Field—The great coal basin of South Wales is the second largest in Great Britain, containing vertical strata about 10,000 ft. in thickness and covering about 906 square miles. It is divided by Carmarthen Bay into two parts. The larger to the east into Monmouthshire is 56 miles long, and the smaller toward the Atlantic Ocean, 17 miles long, and both of them are about 12 to 16 miles across. Its general topography is not unlike that of the New River-Pocahontas field—mountainous and cut by deep valleys.

The coals in this basin vary considerably in character, from true bituminous or gas coals to anthracite. This variation usually shows from east to west; in the east, gas coals prevail, while in the middle they are semibituminous but gradually turn to anthracite in the west; it is even found that seams in the same hill may vary from bituminous to anthracite. In the total area there are 75 seams of coal, 22 of them over 2 ft. in thickness, the latter showing an aggregate of about 54 ft. The estimates of the Royal Commission of 1904-5 on Coal Supplies, gave the total available net tonnage of unmined coal, taking the limit of depth in working as 4000 ft., and the minimum workable thickness at 2 ft., as 21,372,409,604 tons.

Beds of Coal—Owing to the variations mentioned above and to the great mixture of names, many seams having different names in different localities, it is difficult to give any general characteristics of the different beds, except as applied to given localities. Most of the best grades of steam coal, however, come from the Eastern Middle section, in East Glamorgan, to the north, which is about 61 square miles in area. In this section, along the Aberdare, Rhondda and Merthyr Valleys, is mined the majority of the Welsh Admiralty coals, Nixons Navigation, Fernelale, Powell Duffryn, Corys Merthyr, Insoles Merthyr, Penrikyber, Great Western Navigation. (A complete list of coals on the Admiralty list will be found elsewhere.)

Analyses of Welsh Coals—Before making comparisons of the analyses of Welsh coals given below and those of United States coals, it must be understood that it is difficult to make any accurate and final comparisons, based on actual analysis of the coals as shipped and on trials under boilers. There are comparatively few published analyses and calorimeter tests of British coals and such as have appeared seldom give any data as to how samples were taken—whether from commercial shipments or from the seams in the mine.

The methods of making and reporting analyses also differ and in many cases a different type of calorimeter is used, making comparisons misleading; while the few comparative boiler tests that have been made between United States and Welsh coals were often under conditions unfavorable to our product or else the figures were open to doubt. Practically all of such tests have been made by private interests and the results have not been published and are only known by the parties interested.

The British government has made no such elaborate series of tests and analyses of their coals as has our government and as there is comparatively little buying on specifications in Great Britain, little information is available from either of these sources.

*Consulting engineer, 1013 Bank of Commerce Bldg., Norfolk, Va.

Class "A" is the one that includes the best Admiralty coals, due largely to its comparative smokelessness; the coals in class "B" are just as high or higher in heating value and are largely preferred to class "A" coals as they burn more freely and the small coals coke and open out in the fire. By this coking and expansion into a more or less cellular condition, better combustion results and there is little loss through the grates; they can also be burned with smaller grate area and less draft. It is these class "B" coals, which the New River and Pocahontas fuels most resemble in character, structure and in burning qualities, and it is for the reasons given above that they equal the Admiralty coals in the results obtained under boilers.

TABLE NO. 1. ANALYSES OF NINE TYPICAL SOUTH WALES COALS (EVANS)

	A	B	C	D
Fixed carbon.....	82.50	78.00	67.30	75.75-75.75
Volatile.....	12.50	17.00	26.00	20.00-18.00
Ash.....	4.00	4.00	5.50	5.00
Moisture.....	1.00	1.00	1.20	1.25
Sulphur.....	0.85	0.75	0.85	1.75
B.t.u. (calculated).....	14,877	15,038	14,607	14,841-14,842

	E	F	G	H	I
Fixed carbon.....	70.30	66.00	85.00	89.50	87.00
Volatile.....	25.00	27.50	10.00	5.50	8.00
Ash.....	3.50	5.00	4.00	3.50	3.50
Moisture.....	1.20	1.50	1.00	1.50	1.50
Sulphur.....	0.60	1.50	0.75	0.50	0.50
B.t.u. (Calculated).....	14,981	14,614	14,763	14,364	14,620

A, Cardiff Best Large; semi-bituminous steam. B, Cardiff Large, second steam. C, Best Newport Large; bituminous steam. D, Ronda No. 2 steam. E, Ronda No. 3 Steam. F, Gas Coals. G, Dry Steam. H, Anthracite. I, Bastard Anthracite.

The researches of Professor Constans and Dr. Schlaffer, of the Zurich Polytechnic, in 1909, give convincing reasons for the superiority of the coals with the higher per cent. of volatile, such as class "B" and the New River and Pocahontas coals. These researches have established the fact that coals containing about 20 per cent. volatile constituents, yield the highest temperature and best thermal efficiencies. The conclusion that coal which gives the most satisfactory results in the calorimeter, because it contains a moderate amount of gaseous constituents, should also give the most satisfactory results in practice under boilers, is confirmed by these studies and by actual extensive experiments.

TABLE NO. 2. ULTIMATE ANALYSES OF MONMOUTHSHIRE BLACK VEIN COALS

	Newport Abercarn	Mynydd	Western Valley
Carbon.....	84.91	82.91	83.64
Hydrogen.....	5.33	4.89	4.59
Oxygen.....	3.27	5.93	7.01
Nitrogen.....	1.61	1.00	1.06
Sulphur.....	0.57	1.11	0.71
Ash.....	4.31	3.12	2.23
B.t.u.....	14,454	14,677	14,504
Moisture.....	0.80	1.04	0.76

Note:—These are hard coals and stand handling well.

TABLE NO. 3. TYPICAL ANALYSES OF SOUTH WALES AND MONMOUTHSHIRE STEAM COALS

	Fixed Carbon	Vola- tile	Sulphur	Ash	Mois- ture	B.t.u. (Calcu- lated)
Best Admiralty Steam.....	83.40	12.20	0.70	2.80	0.90	14,971
Second Quality Welsh Steam.....	77.20	17.90	0.70	3.00	1.20	15,064
Cardiff Dry Steam.....	85.50	11.00	0.80	2.00	0.70	14,996
Best Monmouthshire Steam.....	75.50	20.50	0.80	2.20	1.00	15,197
Second Quality Monmouth- shire Steam.....	72.80	21.20	1.30	3.50	1.20	14,871
Swansea Dry Steam.....	85.50	10.00	0.90	2.60	1.00	14,812

(Note: Air dried coals, selected analyses.)

Professor Constans states, in summing up the results of his experiments, that from a commercial standpoint, especially where freight charges are at all heavy, short flame coals, containing from 16 to 23 per cent. volatile matter, will prove most economical, because it does not pay to transport either ashes or volatile matter that will escape unburnt.

MINING, PREPARATION, SCREENING AND LOADING CONDITIONS

Most of the mines in South Wales are worked on the single or double, room-and-pillar system, modified by local conditions. Every effort is made to get the coal out in as lumpy condition as possible. Wedges are largely used for breaking down the coal, instead of explosives; the hydraulic cartridge is coming into extended use, especially where explosives are prohibited.

The coal is dumped from the mine cars on picking tables and screens, the greatest care being taken to avoid breakage; it is then passed over screens with 1¾-in. openings, that going over screen being the "large" coal, while the portion going through is divided further by screening into the following sizes:

	Inches	Inches
Nuts, through.....	1¾	over 1½
Beans, through.....	1½	over ¾
Peas, through.....	¾	over ¾
Duff, through.....	¾	

At many collieries the small coals are washed, the nuts, beans and peas being sold for steam making or, mixed with large coals, for ships' bunkers and the duff is used in the manufacture of briquettes and coke. As to what we term run-of-mine coal, there is very little shipped or indeed taken from the mine. The British term "thro" and thro' coal does not have exactly the same meaning as our run-of-mine. "Wro't thro'" coal is our run-of-mine, while nearly all the thro' and thro' coal is made by mixing large and small, at the docks, in proportions to suit the buyer.

It will be seen, therefore, that practically all of the Welsh coal shipped is screened coal. There are three descriptions of large coal, as follows:

Colliery Screened—Screened at the mine only.

Single Screened—Screened once at the mine and also passed over one ¾-in. screen at docks, the latter process taking out about 5 per cent. of the small coal.

Double Screened—Screened at the mine and passed over two ¾-in. screens at the docks, removing about 8 per cent. small coal.

As to difference in price, the "Single Screened" coal averages about 8c. more per ton than "Colliery Screened" and the "Double Screened" 12c. more. The British export statistics show that most of the fuel shipped to countries where we compete is large coal, which, of course, has at least one screening, over 1¾-in. screens.

TABLE NO. 4. ANALYSES OF DIFFERENT WALES COALS

	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur
Clyne Valley 3-ft. Seam.....	Dry	29.90	65.76	4.34	0.84
Fforchiven Steam.....	0.70	10.34	85.74	2.30	0.92
Glanmwrwg.....	1.56	14.52	79.54	4.38	
Great Western Forest Coal.....	1.16			1.76	0.69
Cwmnant Graigola Seam.....		10.04	85.44	3.54	0.98
Pontardulais Smokeless.....	0.68	11.34	82.48	4.52	0.98
Merthyr Slantwit.....	0.81	17.72	73.73	7.75	2.41

All of the docks or piers at the Welsh coal-loading ports are equipped with special appliances for loading ships, most of them worked by hydraulic pressure and having various devices for preventing breakage and for screening the coal; nearly all of the hydraulic tips are equipped with anti-breakage boxes. The Lewis-Hunter coaling boxes are considered the most satisfactory, as they not only avoid breakage of the coal, but do away almost entirely with any trimming of cargoes. These boxes are filled with coal (about 12 tons), lowered into the hatchway of the ship and when the desired height is reached, the conical

bottom of the box is allowed to drop, discharging the coal by sliding in four directions. If it is desired to put the coal only on one side of the hold, the conical bottom can be secured by chains for that purpose. There are several other loading devices at the British docks, but all of them have one point in common, the avoidance of any breakage of the coal.* Of course, the speed of loading cannot compare with the records made by the United States piers, but they are able to do good work even along that line, as the following will show:

5279 tons loaded in 12½ hours
4773 tons loaded in 10 hours
6715 tons loaded in 11 hours

A record of 995 tons in one hour by four Lewis-Hunter cranes working one ship.

WELSH COAL CONTRACT FORM

This is the form generally used by the larger buyers and sellers of South Wales and Monmouthshire coals, a knowledge of which is essential information for the United States exporter of coal.

TABLE NO. 5. A TYPICAL SERIES OF ULTIMATE AND PROXIMATE ANALYSES OF THE WELSH COALS

The following analyses of Welsh coals are taken from Greenwells "Analyses of British Coals and Cokes", 1907, the method of taking samples being specified in only three instances, as noted; the others are picked mine samples and do not represent the coal as shipped, as is shown by the analyses of Naval Merthyr coal, the mine sample yielding 15,492 B.t.u. and the coal as shipped 15,199.

	Proximate				Ultimate						
Admiralty Coals	Moisture	Carbon	Volatile	Ash	Carbon	Hydrogen	Oxygen	Nitrogen	Sulphur	B.t.u.	
Great Western Navigation.....	1.24	77.99	18.53	3.04	86.48	4.04	3.62	0.88	0.70	14,899*	
Corys Merthyr.....	0.43	84.64	12.36	1.86	89.07	4.42	2.40	1.11	0.71	15,508†	
Hills Plymouth Merthyr.....	1.07	.....	.....	3.97	86.98	4.39	1.72	1.01	0.86	15,190†
Naval Merthyr (Mine Sample).....	1.01	80.16	16.37	2.46	88.14	4.58	2.11	1.07	0.63	15,492†	
Naval Merthyr (Cargo Sample).....	1.04	78.83	16.64	3.49	87.04	4.55	2.19	1.01	0.68	15,197†	
Oriental Merthyr.....	0.91	.....	.....	3.37	86.76	4.76	2.24	1.29	0.67	15,471†
Ynysfario Merthyr.....	1.22	85.57	11.69	0.99	.....	.....	.....	.....	0.53	15,172*
Coals not on Admiralty List											
Blaendydach.....	1.20	75.73	19.37	3.01	.....	.....	.....	6.09	0.69	15,070*
Yankee Seam.....	Dry	67.60	30.10	2.30	85.10	5.38	.....	5.62	1.13	15,336†
Clyne Valley 4-ft. Seam.....	Dry	67.86	29.50	2.64	85.40	5.16	.....	.....	1.18	15,307†
Aberdare Merthyr.....	1.25	76.07	18.19	2.93	86.01	4.65	2.61	0.99	1.56	15,193†	
Rheola Merthyr.....	1.31	86.92	7.98	2.78	87.65	4.05	2.21	0.99	1.01	15,085†	
Cwmaman Smokeless.....	0.70	85.57	11.76	1.97	.....	.....	.....	.....	0.52	15,183*
No. 3 Rhonda.....	1.59	72.10	24.58	1.64	84.93	5.11	4.91	1.08	0.74	15,219*	
Phoenix Merthyr.....	Dry	79.90	16.80	2.50	87.64	4.31	3.30	1.45	0.80	15,444†	
Talbot Merthyr.....	0.83	78.02	18.83	3.15	.....	.....	.....	.....	1.28	15,172*

* Calculated from analysis.

† Favre and Silbermann Calorimeter, not used in the United States and giving higher results than the Mahler type.

Note: Greenwells states that this collection of analyses "seems to represent mostly samples furnished by the producers" and while in some cases "fairly large quantities of coal" must have been sampled, in others "there can be little doubt that the analyses represent a picked sample."

WELSH COAL CONTRACT

(Generally adopted by the chief purchasers and sellers in South Wales and Monmouthshire)

Memorandum of Agreement entered into at.....
this.....day of.....19.. between.....
of.....hereinafter called the "Purchasers" and.....
called the "Vendors."

1. **Quantity**—The Purchasers agree to buy and the Vendors agree to sell.....tons of.....Large.....
Coal on the following conditions:

2. **Delivery**—The Purchasers will provide tonnage to take delivery of the coal from the.....to the.....
in as nearly as possible equal proportions per calendar month. Such deliveries shall be into ship at one of the following docks:.....as ordered, on application to the Vendors before ship's arrival.

3. **Loading**—The time for loading to be mutually agreed between the Purchasers and the Vendors when each Vessel is placed on stem, and being subject in the case of steam vessels to the conditions and exceptions of Clauses 2 and 3 of the Chamber of Shipping Welsh Coal Charter, 1896, and in the case of sailing vessels to the Vendors' usual printed form of guarantee. In the event of the Purchasers and Vendors not being able to mutually arrange a stem, the Purchasers shall have the right to place a vessel on stem for the portion of the month's deliveries then due on giving seven days' notice to the Vendors, in which case the Vendors shall be allowed customary hours for loading.

4. **Trimming**—The Trimming shall be done by Trimmers nominated by the Vendors or their agents, and the Tariff Rates of the Port for Trimming shall be paid to the Vendors by the Purchasers in default of Payment by the Ship-owners. The Vendors shall not be responsible for fire, explosion or accident in connection with the Trimming or for any act, default or negligence of the Trimmers or Foremen.

*Some interesting descriptions of English bunkering stations will be found on pages 147, 316, 355 and 364 of Coal Age, Vol. 2.—Editor.

5. **Wharfage**—The Purchasers undertake to pay to the Vendors or the Dock Company the usual wharfage of 4c. per ton.

6. **Quantity and Weight**—The Purchasers shall inspect the coal in the wagons on the tip-road at the place of shipment, and any objection to quality or condition shall be raised before shipment, or be deemed to be waived. The returns of weight as ascertained at the Loading Tips by the Dock or Railway Company shall be final and conclusive for all purposes whatsoever.

7. **Price**—The Purchasers shall pay the Vendors the price of.....per ton for colliery screened coal.....per ton if single screened at time of shipment.....per ton if double screened at time of shipment.

8. **Payment**—The Purchaser shall make payment as follows:

9. **Strikes and Accidents**—In the event of a stoppage or partial stoppage of the Vendors' Pits, or any of them, or on the Railway or Railways over which the Vendors' traffic is usually carried between any of the Vendors' Pits and the place of shipment, or at the Dock named as the place of shipment or of a suspension of work by Trimmers or Dock, Railway, or other hands connected with the working, delivery or shipment of the said coal or from any cause whatever, whether or not of the same nature, the Vendors shall not be called upon to deliver any coal during a total stoppage, and

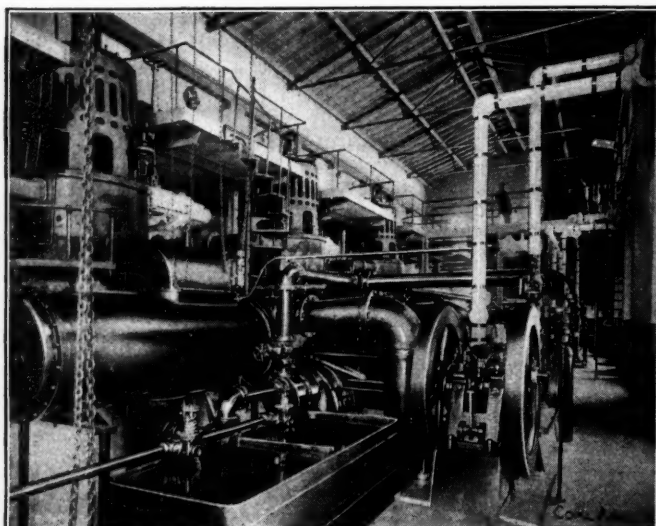
in the event of a partial stoppage the Vendor shall be entitled to a reduction in the deliveries proportionate to the reduction in their output. No liability shall attach to the Vendors for any such default of shipment, notwithstanding the fact that during such period coal may have been shipped by them. The time within which the above-named quantities are to be taken and delivered shall be extended for a period at least equal to that during which deliveries are suspended, or as otherwise arranged by mutual agreement.

10. **Insolvency**—In case of any default on the part of the Purchasers in making any payment on the date specified, the Vendors may suspend deliveries until such payment is made, and it shall be at their option whether they will afterward make up any deficiency in deliveries so caused; or if the Purchasers shall have been declared bankrupt, called any meeting of their creditors, or make any acknowledgment that they are unable to pay their debts in full, it shall be at the Vendors' option to consider the contract null and void.

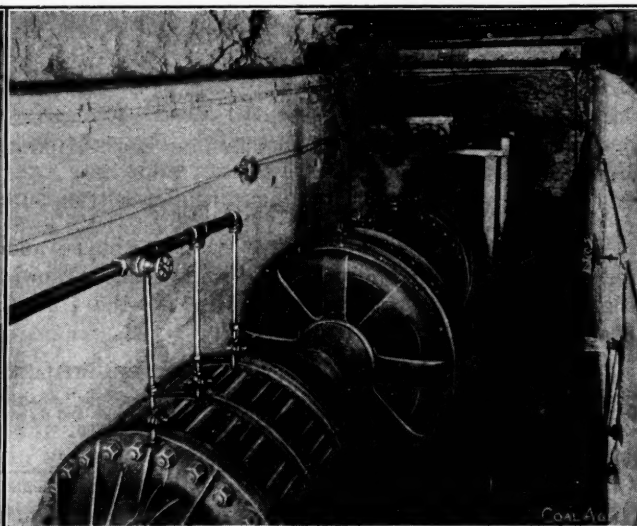
11. **Damage for Failure to Take or Deliver**—Unless otherwise mutually arranged, Purchasers agree in the event of their failing to charter and stem tonnage to take each month their regular monthly quantity in accordance with the terms of this contract to pay to the Vendors as and for liquidated damages the difference between the current price on the last days of such month and the contract prices on the quantity they have so failed to take, and the Vendors agree that in the event of their declining to accept tonnage to take each month the regular monthly quantity in accordance with the terms of this contract, to pay to the Purchasers as and for liquidated damages the difference between the current price on the last day of such month and the contract price on the quantity for which they have so declined to accept tonnage.

12. **War**—In the event of the United Kingdom being at war with any European Powers or any prohibition being made by the British Government on the export of Welsh coal, the quantity due for delivery under this contract during the period over which such war or prohibition extends shall be cancelled.

SNAP SHOTS IN COAL MINING



SHOWING GENERAL ELECTRIC STEAM-TURBINE GENERATORS IN D. L. & W. R.R. Co.'s NANTICOKE POWER STATION



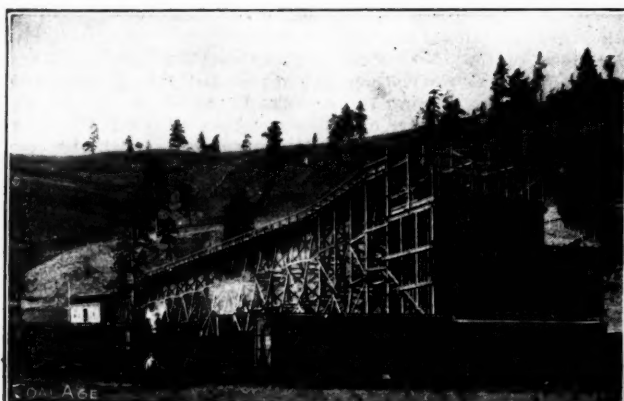
CENTRIFUGAL PUMP OF D. L. & W. R.R. Co. AT HAMPTON SUMP, DIRECT CONNECTED TO G. E. INDUCTION MOTOR



THE STORE OF THE WESTERN COAL & MINING Co., AT BUSH, ILL., WAS DESTROYED BY A CYCLONE



STEEL TIPPLE, ENGINE HOUSE AND PART OF BOILER PLANT, LAKE CREEK MINE, JOHNSTON CITY, ILL.



TIPPLE AND TRESTLE APPROACH, INLAND COAL & COKE Co., MERRITT, B. C. LOCATED ON CANADIAN PACIFIC R.R.



COAL WASHERY OF ST. BERNARD MINING Co., EARLINGTON, KY. ONLY WASHERY IN WESTERN KENTUCKY FIELD

A New Gasoline Locomotive

The accompanying illustration shows an 11-ton gasoline locomotive drawing a trip of 18 four-ton cars up a $\frac{1}{2}$ per cent. grade at the Prospect Colliery of the Lehigh Valley Coal Company.

This machine was built by the Vulcan Iron Works, of Wilkes-Barre, Penn. The track gage is 42 in., the wheel base 48 in., the height is 4 ft. and the width is 4 ft. 8 in. The diameter of the driving wheels is 21 in. and the tractive effort is 4000 lb. Operating at 600 r.p.m. the engine will develop 45 hp. while the speed varies from 4 to 8 miles per hour. The machine is equipped with hand-operated brake, and as may be seen in the photograph, is provided with a bell to give warning of ap-



A VULCAN GASOLINE LOCOMOTIVE AT THE PROSPECT COLLIERY, WILKES-BARRE, PENN.

proach. When used underground, this bell is dispensed with.

In the present stage of its development there can be no question as to the utility of the locomotive impelled by internal-combustion engines. It must be acknowledged, however, that these machines require a certain amount of skill on the part of the operator in order to obtain the best results, and naturally this can only be acquired through intelligent experience.

The builders of gasoline mine locomotives have all the experience of the automobile designers from which to profit as well as that of the makers of electrically operated haulage motors. They should be able, therefore, to turn out a product which, so far as reliability is concerned, is equal to any present-day automobile or power truck. And, although slight difficulties may be experienced at first in operating such motors, these will rapidly disappear as the driver gains familiarity with the machine.

One Western mine manager who recently installed gasoline locomotives in several of his mines, had serious trouble at first, in securing men of sufficient intelligence and mechanical experience to successfully operate these machines. This trouble was overcome when he secured a number of chauffeurs, who were out of employment in a near-by city, and sent these men to the mines to operate the gasoline locomotives.

According to actual tests, coals consumed in producer-gas plants develop about $2\frac{1}{2}$ times the power that the same coals would develop in the ordinary steam-boiler plant.

Small Steam Turbines

When running at an economical speed, the small steam turbine is now practically equal in steam economy to the reciprocating engine of equal capacity. Due to the higher speeds employed, less floor space is used. Practically no attention is required, as the only lubricated parts are the main bearings and the governor.

The turbine shaft has a constant turning effort exerted upon it, which makes it desirable in driving small lighting sets, exciters, centrifugal pumps and blowers.

Since there is no inside lubrication, the exhaust steam is free from oil, and, therefore, may be used in an open feed-water heater and returned to the boiler, the efficiency of the thermal process being practically 100 per cent. Due

to the absence of mechanical friction in the chamber in which the steam does its work, the parts here do not wear appreciably, and, therefore, the steam economy of the turbine remains practically constant.

The Mine Mule of Today

[One of our advertisers after reading Mr. Braley's verses on the mine mule, in our Jan. 25 issue, comes back with the following refrain: The effort entitles him to whatever publicity he will get.—Ed.]

That pictures Mr. Mine Mule as he once was long ago,
The poor old sinner had to work, you bet;
But now the modern mine mule, as he works all day below,
Hardly has enough to do to make him sweat.
He's as playful as a kitten and as gentle as a lamb,
And the skinner now is acting like a saint,
And you never hear him cussing—not a single little damn,
All of which may seem a story, but it ain't.

And the cause for all these changes in the labors of the mine,
Which is making Mr. Mine Mule fling his heels,
And which turns the busy skinner to a person near divine,
Is the Hyatt Roller Bearings in the wheels.
And so every day is easy for the skinner and his friend,
And they're looking "like a dividend that's fat,"
And they think that Braley's joking when he carols near the end—
"May he go where all the saintly mules are at."

British Inspector's Report, 1911

SYNOPSIS—An account of some methods of spraying in British mines and of a coal-dust explosion which occurring above ground, could not have been aided by gas. The use of electric hand-lamp lighting is on the increase. The dangers of electric shotfiring with damp detonators are exemplified and a severe outburst resulting in 3 fatalities is described. Some notes follow on the use of ropes to increase the strength of collars and on the flushing of gobs.

✱

Thomas Mottram in his report for the Liverpool and North Wales district of Great Britain says that there are some mines at which steps are now being taken to prevent coal dust from entering the downcast. In some cases the sides of the shafts are to be enclosed between the surface and the landing. In three or four instances the coal dust made in unloading the cage and in dumping and screening the coal is collected by suction.

Tubes connected with the screens at one end suck in the dust by means of an exhaustor; and a water-spraying device then douses what is thus collected. The chamber which receives the dust is provided with an outlet for clean air and another for the conduct of the water and dust to a settling tank. By this means a considerable quantity of the surface dust, which would otherwise descend the downcast, is secured and ultimately used for fuel.

SPRAYING LOADS AND EMPTIES

Even where this system is in vogue, a considerable amount of dust still descends the downcast, it being blown from the cars in their rapid ascent to the surface. This can be obviated to a considerable extent by spraying the contents of the cars in transit or near the shaft bottom. Where this is done the comparative absence of dust at the bottom of the shaft is quite apparent. The spraying of empty cars at the screens or at some other convenient point on the surface, is also well worthy of consideration.

PORTABLE SPRAY TANK

Reference is made to a portable spray tank for laying the dust in working places at Pemberton colliery, Wigan.

This 2-gal. device is only 16½x8x5¼ in., and is carried by means of a canvas sling thrown over the shoulders of the operator. It is necessary to fill the tank three times to water each working place—a length of 60 or 90 ft. of floor, roof and sides. The pump empties the tank in 8 to 10 min., according to the speed of rotation of the crank. The diameter of the nozzle is 1½ mm. (⅙ in.). The water is thrown out in a fine spray, and it takes 30 min. to water each working place.

A COAL DUST EXPLOSION ABOVE GROUND

It may be interesting in connection with this dust problem to describe a somewhat remarkable coal-dust explosion on the surface, caused by excessive sparking of an electric motor at New Brancepeth colliery. The explosion, to which reference is made by Inspector A. D. Nicholson of the Durham district, took place in the coal-grinding house where a 25-hp. direct-current motor at 500 volts was in use for driving the machinery.

The motor was enclosed but not gas-tight, and stood on a platform about 6 ft. above the ground floor. Owing to the short circuiting of one of the armature coils much sparking resulted and this ignited the coal dust inside the motor casing causing an explosion which produced sufficient force to blow off the sheet-iron covering over the commutator end of the motor.

The flame thus produced was sufficient to explode the fine dust held in suspension within the building and the flame extended 6 ft. outside the open door of the house and for a height of 15 ft. inside. The report was heard some distance away. Some panes of glass were broken, but there was no further damage as the roof, which was partly open, was composed of corrugated iron. Fortunately the engineman was not inside the building at the time. In view of this accident, the company decided to erect the motor outside the crusher house.

PORTABLE ELECTRIC VS. OIL SAFETY LAMPS

In the Yorkshire district, 241,282 working people were employed in 1911 and 211,356 safety lamps were in use. A noticeable feature was the increase in the number of portable electric lamps from 69 to 922. With the approval of the late Inspector W. H. Pickering, the management of two mines introduced this type of lamp into the workings.

They give an incomparably better light than the safety lamps and in his view their general use would have the effect of reducing accidents, especially from falls of roof and from haulage. Before agreeing to the introduction of these lamps, however, he drew the attention of the management to the following points:

1. An explosion might occur in an explosive atmosphere (a) if the connection between the battery and filament was broken or (b) if both glasses were shattered.
2. If electric lamps are used, arrangements will have to be made for the periodical testing for firedamp by safety lamps or other means.
3. Objection (a) can be overcome by a proper method of locking the lamp (e.g. by a lead rivet) and a rule requiring that no lamp shall be unlocked and opened except on the surface.
4. The danger that the glass will be broken is far more remote than in the case of an oil safety lamp. It is probable that a shock which would break the outer glass would also break the thin glass of the bulb. The outer glass, however, is stronger than that of an ordinary safety lamp and is better protected. The better light given by the electric lamp enables the miner to set it in a place safe from falls or where tools cannot strike it.
5. The lamp gives such a splendid and clear light that accidents should be greatly reduced wherever these lamps are used.
6. The following conditions should be observed in using these lamps: (a) They should be locked with a lead rivet having a clear device on each face. (b) No lamps should be opened except by an authorized person and on the surface. (c) Arrangements should be made for frequent testing for firedamp by safety lamps or other means. (d) Any man ill-using a lamp, or damaging it, or having

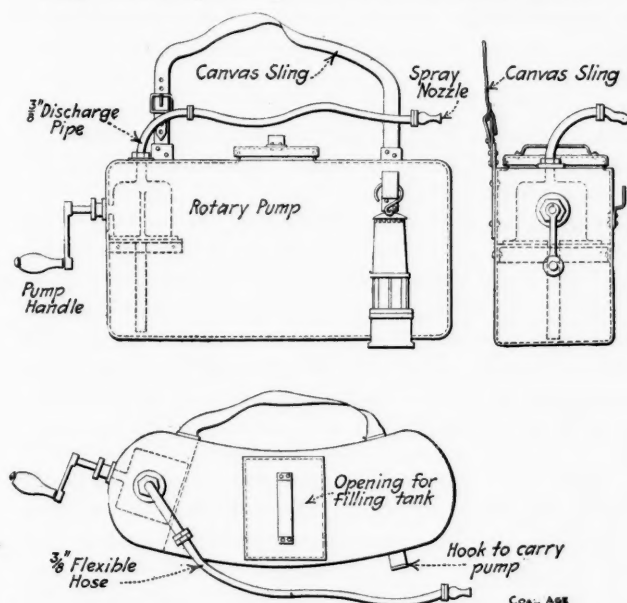
it within two feet of the swing of the tools, should be prosecuted.

EXPLOSION OF SHOT AFTER BATTERY IS DISCONNECTED

There is a prevalent belief that, when shots are fired by electricity, all danger in returning to a missed or hanging shot is removed if the firing cable has been disconnected from the battery.

Reference to this is made by Inspector Hugh Johnstone of the Midland and Southern district, and he says the fallacy of this idea has been proved on many occasions. One of these delayed ignitions occurred at Snowdon colliery in Kent, where 13 shots charged with Rip-pite and provided with No. 7 electric low-tension detonators, especially insulated for submarine work, were being fired in the bottom of a shaft then being sunk.

They were coupled together in series and connected up



A PORTABLE SPRAY USED TO DAMPEN THE RIBS IN A ROOM PRIOR TO SHOOTING DOWN COAL

to a dynamo which was generating a current of 220 volts. The shots failed to go off and the wires were uncoupled from the cable. Three minutes afterwards, one of the shots in the middle of the series exploded, leaving the other 12 shots intact. The makers of the explosive were questioned about this failure but while they admitted that such occurrences, although rare, were unfortunately not unknown, they were unable to give any conclusive explanation.

DANGER OF DAMPENED FUSES

Mr. Johnstone says he has come across quite a number of such occurrences in which shots have exploded an appreciable time after the cable had been disconnected from the exploder and in one case after it had also been disconnected from the fuse wires.

The most feasible explanation appears to him to be that the priming charge in the detonator had become more or less damp and had been ignited but not flashed by the passage of the current. Thus it had smouldered for a time until sufficient heat was developed to fire the fulminate of mercury.

Some years ago Inspector Johnstone experimented with

a number of electric powder fuses in which the priming charge had been purposely dampened, and in some cases actually moistened, by exposing them to a jet of wet steam. Although they all failed to fire on the first attempt, by repeatedly passing the current through them, the inspector succeeded in firing even those which had been moistened. It appears to him that the only way to obviate risk of accident is to prohibit any one from returning upon electrically fired hanging shots until at least 15 min. have elapsed.

AN OUTBURST OF GAS DISLODGES 190 TONS OF COAL

An accident of an unusual character, causing the death of three miners, John Peden, George Peden and James Jamieson, occurred at Valleyfield colliery, and is discussed by Inspector W. Walker, who has charge of the Scotland district. The sinking of both shafts had just been completed.

A cage was put in the No. 2 shaft and rapid progress was being made in the work of forming the shaft parting and driving the roadways. The guides were fixed in the No. 1 or downcast shaft, but as the sheaves of the head-frame were being erected, this shaft was not available at the time of the accident. The upcast or No. 2 shaft is 1290 ft. deep and cuts the Five Foot Seam in which the accident occurred at a depth of 1200 ft. Two levels had been turned out of the shaft in this seam, one to the north-west and the other to the south-east.

An outburst of gas occurred at the face of the south-east level in the Five Foot Seam about 300 ft. from the No. 2 shaft, displacing more than 190 tons of coal and the men were overcome and suffocated by it. There were six men on the south-east side of the pit, three in the heading nearest to the shaft and three in the face of the level, the latter being suffocated by the coal displaced by the outburst.

DRAFT PRODUCED BY ASCENDING STEAM

The colliery being new and the fan incomplete, the inspector says ventilation was produced by means of induced draft caused by the discharge of exhaust and live steam into the upcast shaft. This resulted in about 7200 cu.ft. of air per min. travelling the workings and around the South side of the Five Foot Seam. The first heading which is 60 ft. away from the shaft, was 117 ft. up from the level, and the second 120 ft. further in, 60 ft. up. When measured, at 8 a.m. on the day of the accident, the face of the south-east level was 114 ft. from the second heading.

A brick wall 4 in. in thickness had been built on the low side of the road from the upcast shaft to within 40 ft. of the level face and from this point the air was carried forward by ordinary brattice cloth and on leaving the face of the level it was conducted up to the end of each of the headings by the same means. The haulage road was, therefore, the return airway.

THE CAUSE OF THE OUTBURST.

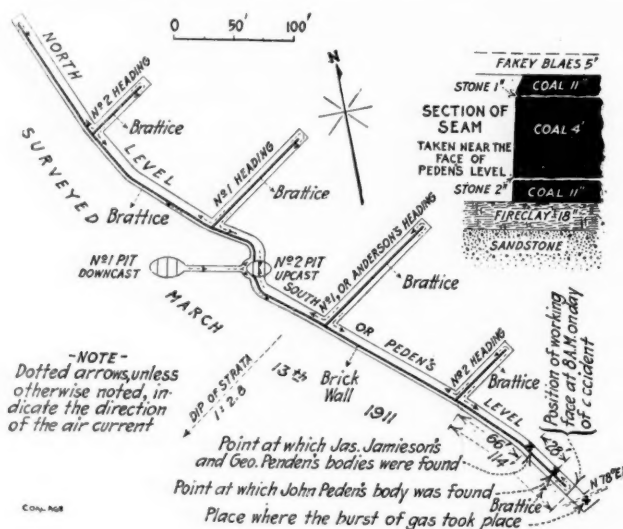
Only the south-east level was affected. At the time of the outburst three men were working in the first or outside heading, none in the second heading and three in the face of the level. When the three last mentioned were found by the rescue party from the surface, George Peden and James Jamieson were facing outby, lying

about 48 ft. back from the face; John Peden was also lying facing downwards, about 20 ft. back from the original end of the level.

All three, being buried under 5 ft. of coal dust, had been smothered, but on removing John Peden's clothes it was found that he was severely blistered, due to his having been close to the face, and having experienced the full effect of the sudden expansion of the gas. When the face of the level was ultimately reached, it was discovered that a small rise fault crossed about 7 ft. in advance of the original position of the end of the heading and that the face of the level had been blown out or advanced for 12 ft. in addition to which a hole, some 30 ft. long and running parallel with the fault, had been formed on the upper side where the seam rises 1 in 1½, whereas at the shaft the inclination is 1 in 2.8. The coal near the fault was burnt, and further back it was sooty and soft.

PRECAUTIONS TO PREVENT OUTBURST ACCIDENTS

After the accident the agent undertook that boreholes be kept at least 40 ft. in advance of the faces of the levels



A FATAL OUTBURST OF GAS AT A FAULT REMOVING 190 TONS OF COAL, THEREBY SMOTHERING THREE MEN

and headings. On one occasion when a borehole of this kind was being drilled, the rods were blown out of the hole and gas at high pressure continued to be given off for some hours.

The holes have frequently been choked with small coal. At times, this slack has been blown out in clouds of fine dust to such an extent that boring had to be discontinued until the gas blew off and the pressure decreased.

To prevent outbursts of this kind, causing loss of life, the inspector thinks it necessary, in addition to boring in advance, to have experienced men, such as firemen in charge, always on the watch for movements in the coal face. Also he advises that the same workmen be kept in such places with orders to retire if there is any sign of the coal working more easily or moving toward them. As soon as a pocket is located the face should be riddled with holes in order to liberate the gas behind it.

BURNT COAL COMMON IN FIFE SHIRE

Burnt coal is often found in the coal mines in Fife-shire. In the deeper measures, it is as a rule close to

faults. As he points out, it is caused by the obtrusion of whin (eruptive rock) beds, which appear to have burnt the coal after it was deposited. Through movement of the surrounding strata, small parts of the coal seam have been disintegrated, and thus filled with gas at high pressure.

When the intervening solid coal between the burned area and the face of the workings becomes too weak to resist the pressure, it bursts away and the small coal pours out like running sand. This disintegrated coal containing gas appears to be in local patches.

At Valleyfield, the south-east level appears to have been driven against one of these pockets of gas and disintegrated coal, with the result that upon the face reaching within 7 ft. of the fault, the pressure overcame the resistance of the coal and blew it out with such force that the men had no chance to escape. Safety lamps had been introduced or more men would have been killed, as an explosion of gas would have followed the outburst.

OLD WIRE ROPES AS ROOF SUPPORTS

Old wire ropes are utilized at a mine in Lanarkshire, in conjunction with timber as aids to the support of the roof on a haulage road.

The seam lies from 24 to 84 ft. below the surface and it is owing to this fact that some difficulty has been experienced in its working. The stratum above the seam, at a depth of 60 to 84 ft., is fakey blaes (laminated blue shale), but nearer the surface, the roof is composed of irregular blaes, boulder and surface clays. In wet weather, owing to its becoming saturated with water, it is difficult to support.

Formerly much timber was used but its life was short and little could be withdrawn or restored. After hearing a paper read by Sam Mavor, before the Mining Institute of Scotland in 1908, describing a method of supporting roofs in Silesia by means of timber strengthened by old ropes, the management decided to give the system a trial. It has been found that not only was the saving of timber and labor considerable, but the roof of the main haulage road was much more efficiently supported. Collars or cross bars which before would have had to be renewed in six months, have already lasted over 3 years.

HOW THE ROPES ARE FASTENED

The method of fixing the rope to the collars is as follows: The timber is carefully examined, and after it is decided which is the more suitable side on which to place the rope, a small piece of the thick end of the collar is flattened and a small "V" shaped notch is cut in the end of it; the rope is drawn straight and tightened along the under side of the collar to within about 12 in. of the small end, and a staple driven down over the rope to prevent its moving.

The rope being in position is further secured by the addition of staples along its length at intervals of about 20 in. The end of the rope is turned back over the end of the collar and secured on the upper side by means of other staples. The other end of the collar is left unfinished because the length which may be required is not known and the original length may have to be reduced before the collar is used. In this condition the timber is sent down the shaft. The man putting the collar in position finishes the uncompleted end in the same way as

the other, after he finds the exact length which is required.

Great care is necessary in the choice of the rope to see that only the best is used, that there are no broken wires at the time of erection and that it is in such condition that the wires are not likely to break as long as the timber remains in position, as broken wires would be dangerous to persons and animals traveling along the road.

FLUSHING GRAVEL

A portion of the Wishaw Coal Co's leasehold at Dalzell and Broomside colliery lies along the banks of the Clyde, and the greater part of the area is covered with a bed of water-bearing gravel.

The main seam, 150 ft. below the surface at this point, has been worked out into pillars known as "stoops" about 60 ft. square. Owing to the danger of rapid subsidence, breakage of the roof and flooding of the workings, a constant menace to those in the deeper seams, the owners were advised by their mining engineer, R. W. Dron, to extract the pillars and fill the waste with "redd" from the refuse heaps on the surface, by means of the flushing system.

The seam in question is 4 ft. thick, and has a strong roof and blaes floor. The dip of the strata is 1 to 8 to the south-west, and fairly regular.

A large heap of washer debris consisting of burnt shale and fireclay was at hand on the surface, and that is probably the best material for flushing, as in the absence of grit the iron pipes carrying the filling materials are not worn. Moreover the fill is not subject to spontaneous combustion.

The pipe line is carried down a borehole to the workings of the main seam; another borehole affords a passageway for the electric cables which supply power to the pump, and a third hole is used for the discharge column which returns the used water to the surface.

The material passes through cast-iron pipes to the working face. There it enters a line of wrought-iron pipe, $\frac{3}{16}$ -in. thick, of the same diameter as is used for the main line.

The working face consists of four pillars with the roads between them, amounting in all to a straight line of 260 ft. to the full dip of the strata. This face was at first prepared for the flushing by a rock packwall 30 ft. wide erected on the low end, but since work has been in progress it has been found that little or no pressure falls on the wall and it is now built only about 6 ft. wide.

HOW THE CARS ARE HANDLED

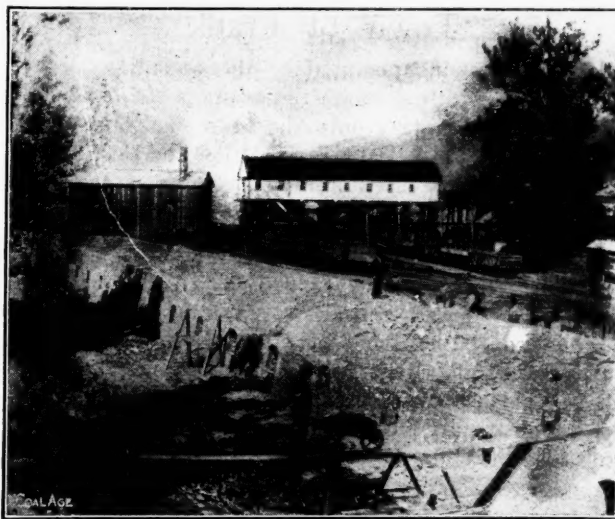
An ingenious method of letting the full cars down the face is in operation. A bogie is attached by a clip to a single rope and passes down the face collecting the cars filled by the miners and lowering them to the haulage road.

Turf as a Fuel

In most parts of the Faroe Islands, turf is still the chief fuel used. In some places, however, coal is preferred, and its use is increasing as the supply of turf is becoming exhausted. Nowadays there is less economy than formerly in burning turf, since coal has become somewhat cheaper, and much time and labor are required to cut the turf and carry it often many miles over rough country to the homes of the people.

An Early Coke Plant

The accompanying illustration shows the surface plant of the Waverly mine of the Pittsburgh Coal Co., located at Smittown, Penn. In view of the fact that this picture was taken in the year 1877, it is interesting from an historical standpoint. The old type of railroad cars is particularly noticeable. On the left is a train of short gondola cars, such as were used at that time.



THE WAVERLY PLANT IN 1877

In the foreground, and extending back to the washery is a battery of beehive ovens, which are in the course of erection. In those days this mine was operated by the late Judge Thomas Mellon, of Pittsburgh, Penn., and J. B. Corey, of Braddock, Penn. The waterboy who stands at the right in the picture is J. B. Neel, now employed by the Pittsburgh Coal Co.

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Increased Shipments of Australian Coal

The shipments of coal from Newcastle, New South Wales, during the six months ended June 30, 1912, amounted to 2,218,692 tons, valued at \$5,603,833, compared with 1,846,633 tons, valued at \$4,696,128, for the corresponding period in 1911. The increased shipments were principally to other parts of the Commonwealth and New Zealand. Victoria took 148,000 tons more than during the first six months of 1911, New Zealand 73,000 tons more, South Australia 49,000 tons more, Western Australia 28,000 tons more, and Tasmania and Queensland each about 10,000 tons more. The increase in the foreign trade was 53,877 tons, Chile taking 47,000 tons more and Java doubling its purchases, while the Straits Settlements took 28,000 tons less and the Philippine Islands 45,000 tons less.

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Geo. Knox, in a recent article, states that it is difficult to adopt the flushing system in mines where the working operations are far advanced, particularly in those seams where the advancing system of longwall is in use and the shafts are sunk to the dip of the territory. It cannot be applied to newly opened collieries, nor to most collieries where thick seams are worked, either by retreating longwall or room and pillar. The only difficulty in the latter case will be the cost of either driving tunnels or else levels in the upper seam to the rise of the coal to provide fall for the debris in the pipes.

CURRENT COAL LITERATURE

How Coal Mining Threatens the Town of Frank

The commission appointed by the Canadian Department of Mines to investigate the prospect of further falls from Turtle Mountain onto the town of Frank, Alta., included Reginald A. Daly, W. G. Miller and Geo. S. Rice. The latter is, of course, mining engineer of the U. S. Bureau of Mines.

FEAR OF A SECOND SLIDE

A slide, occurring on Apr. 29, 1903, killed 70 people in the town of Frank and destroyed much property, including nearly 7000 ft. of the Crows Nest Branch of the Canadian Pacific Ry. Quoting an earlier commission, which reported June 12, 1903, the commissioners say:

In their report, R. G. McConnell and R. W. Brock state that the slide was due, not to a single cause, but to a combination of causes, among which the opening up of large chambers in the mine, situated under the base of the Turtle Mountain, may have been contributory. Speaking of the North peak and shoulder of the mountain overlooking the town, they say "the caving of the rooms in the mine, after the coal has been withdrawn, perhaps long after the inhabitants of the town have lost all dread of another disaster, may precipitate it suddenly in a second destructive slide. Since this possibility must always overhang the town, it certainly seems advisable that it be moved a short distance up the valley beyond the reach of danger."

It appears that all the cross-sections striking the two main peaks of Turtle Mountain show that the slope continuously gets steeper as the peak is approached. The level of the Crows Nest River is 4155, while the North peak of Turtle Mountain is 6911 and the South peak is 7204.

CANNOT SLIDE ON BEDDING PLANES

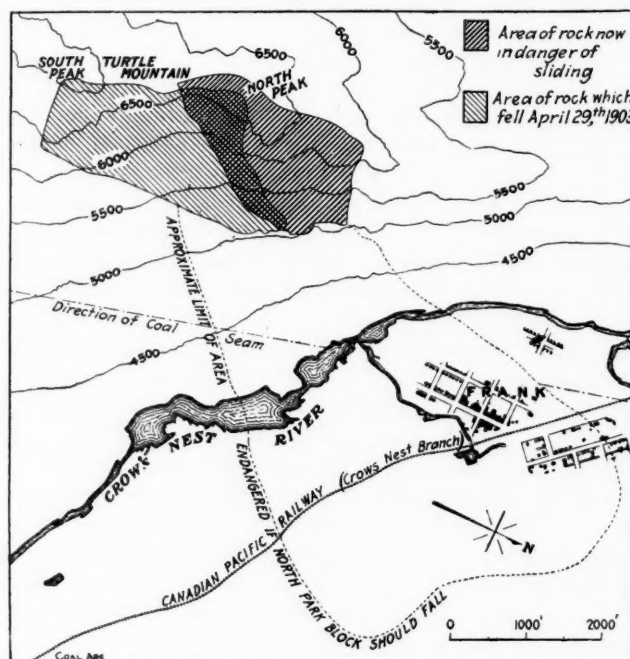
As will be seen from the cross-section accompanying this article the sloping of the measures is such as to assure that parts of the mountain could not slide into the valley by the slipping of one bed on another because the measures dip in the opposite direction with an extremely marked pitch. But the trouble arises not from the bedding planes, but from the jointing of the measures. These joints are lying at so steep an angle that if they part from any cause such as the weight of the rock, seismic, mining or other disturbances, or from the action of frost, the detached masses will freely slide and even more readily roll down into the valley.

The commissioners state that the rock, constituting the coarse rock debris in the longest talus slope eastward from a point near the South peak, is of such a character that it will rest on an angle of 30 deg. to the horizontal, but if the rock mass begins to move on a surface of that slope it will continue to slide till it reaches the foot of the mountain. That is, its angle of rest is 30 deg.

We have seen that the measures on the mountain are so disposed that they cannot slide into the valley, but if

they should be broken by any means at right angles to the plane of bedding, the parts thus broken would be almost sure to be precipitated onto the town below. All that is necessary is that the plane of fracture should lie at 32 deg., or more to the horizontal.

The pieces deprived of their structural connection with the mass of the mountain would be sure to slide over the plane of fracture and descend to the valley. Bearing in mind this outside value for the limiting angle, an



PLAN SHOWING AREA OF ROCK THREATENING TO PRECIPITATE ITSELF ON THE TOWN OF FRANK, ALBERTA, CAN., WHERE A LARGE SLIDE HAS ALREADY FALLEN

inspection will show the large amount of rock which could fall from Turtle Mountain.

THE WEAKNESS OF TURTLE MOUNTAIN

If that mountain were composed of homogeneous granite or nonjointed limestone, the foregoing calculation would have no practical value; the strength of such rock would be such as to make absurd any reference to the critical angle above defined in connection with the problem of the mountain's stability. But Turtle Mountain is peculiar in possessing a structure which forbids placing an estimate of an absolutely safe angle for the eastern slope at much greater than 30 or 35 degrees.

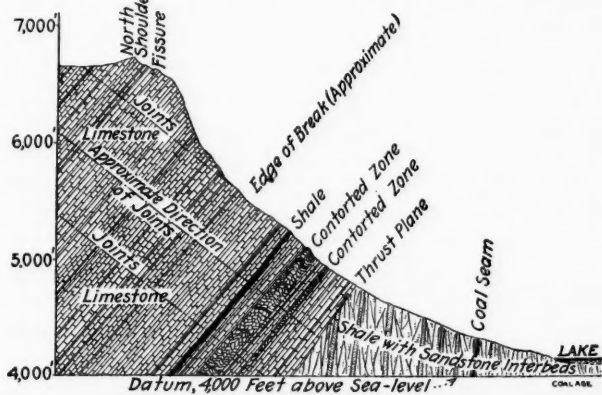
This is not meant to imply that all the rock bounded by slopes greater than about 35 deg. is in danger of sliding before the ordinary processes of erosion have lowered such slopes. Such a danger is remote according to the commission, except in a limited area where structural weakness is combined with steepness of slope in a manner to threaten disaster to the town.

A 3000-FT. MOUNTAIN ON A FOOTING OF SOFT SHALE

From the river flat to the lower contact of the limestone (that is, the outcrop of the thrust-plane), the mountain slope is underlain by soft shales, interrupted by coal seams and by some interbeds of sandstone. The whole is an unusually weak mass of rock; yet it forms the basal abutment which is today helping to sustain the heavy limestone forming the upper half of the mountain.

Weak as this lower member is, it might continue to hold up the entire slope if it were not for the inherent weakness of the limestone itself. The latter is composed of rapidly alternating beds of contrasted nature. Some of them are thick, massive and coherent, and, if the whole upper member were constituted of similar material, the chance for a destructive slide in the future would be greatly lessened.

But many other beds are flaggy, easily split along the bedding planes and, therefore, far less strong than the beds just mentioned. On this account alone the average strength of the whole limestone member is much below that of many, and perhaps most, of the great limestone



CROSS-SECTION OF MEASURES, SHOWING COAL SEAM, WEAK SHALE, CONTORTED LIMESTONE AND THE THREATENING NORTH PEAK

formations of British Columbia or Alberta. In addition, the total strength of the member is seriously lessened by the presence of two zones of crumpling within the mass.

These zones are diagrammatically shown in the section. It should be carefully noted that the lower edge of the rock, which fell in April, 1903, coincides with one of these contorted zones. That event actually illustrated the profound weakening of the mountain structure due to their presence. Another source of weakness is found in a band of soft shales, which breaks the continuity of the limestone.

THE LIMESTONE IS FULL OF WIDE JOINTS

However, the chief reasons for concern as regards this matter of rock strength, are the heavy jointing of the limestone and the relation of the joints to the eastern slope of the mountain, the side facing the town. As is so often the case with sedimentary rocks, very abundant joints occurring in several systems are developed nearly or quite perpendicular to the bedding.

The dip of the strata is always westward, and varies from 50 deg. to 65 deg. At the North and South peaks, and for a considerable distance north of the former peak (that is, the part of the mountain opposite the town), the average dip is about 50 deg. to the west. This means that many of the joints mentioned dip directly eastward

at an angle of 40 deg. The actual dips of the bedding and joints are almost ideal for the production of great intermittent slides from any mountain as steep as that under consideration.

The joints are thus of profound importance as they so seriously affect the strength of the limestone and, by their attitude, furnish potential slipping planes, which threaten to become sliding surfaces if a heavy jar or a disturbance of the basal abutment should occur. Moreover, the joints are favorable channels for the seepage of ground-water. This tends slowly to enlarge them and also to wet the rock, increasing the danger of sliding *en masse*.

WORKING COAL MINES A SOURCE OF DANGER

The commission declares that mining in the coal seams at the foot of the mountain is likely to produce or aid in the production of a slide, thus imperiling the town of Frank and its inhabitants. The only method known to the commission that would insure against appreciable subsidence is that of hydraulic packing with sand.

The settlement, after packing with ordinary sand, is less than 5 per cent.; with granulated slag, settlement is inappreciable, and it would probably be equally imperceptible if sharp, clean sand were used. The use of loam and sandy clay, ashes or crushed shale is less successful, the settlement with such material being from 10 to 15 per cent.

SAND FLUSHING NOT PRACTICAL

It does not appear possible to employ sand filling under ordinary commercial conditions in the Turtle Mountain district. There are no large bodies of clean sand at hand. The only available source from which material could be obtained in sufficient quantities would be the sandstone at the base of Bluff (Goat) Mountain. This would have to be quarried, crushed, transported and flushed into the mine. The cost with the high labor rates which prevail in Alberta, plus repairs, renewals and capital charges, would add not less than \$1.25 per ton of coal extracted, even if done on a considerable scale. The cost of installing the necessary plant would also be great, so that the system appears commercially impossible under the competitive conditions of coal production in that district.

While the use of dry packing probably lessens the amount of subsidence, the experience with the long-wall method of mining both in America and Europe, where dry packing is employed, indicated that a settlement of 40 to 60 per cent. of the thickness of the seam must be expected. It takes several years to reach the full settlement, but any portion of such contraction might cause disastrous slides.

The only conditions under which mining should be carried on in the danger area above described are: (1) The townsite should be abandoned and compensation for the damage to the property of the Canadian Pacific Ry. assured. (2) The present entrance to No. 1 mine, which is a drift, should be abandoned and the mine should be operated by deep levels from the shaft, or from an opening at the extreme southern end of the property in the vicinity of Hillcrest. (3) Unusually heavy pillars should be left throughout the danger area, particularly in the upper levels, and not more than 50 per cent. of the coal should be extracted. (4) The excavated areas should be packed.

Edison Electric Mine Lamp

The *Engineering and Mining Journal* gives the following account of the Edison mine lamp:

The accompanying illustration shows the general features and the manner of carrying a new safety electric lamp, which is operated by an Edison storage battery of the type for the development of which Mr. Edison was recently awarded the Rathenau medal by the American Museum of Safety.



EDISON ELECTRIC LAMP
AND STORAGE BATTERY

The battery is inclosed in a nicked-steel container, from which the electrolyte cannot escape. It is claimed that the cell cannot be so over-charged, as to injure it, and charging it in the reverse direction, or leaving it in any state of charge or discharge does it no harm.

The cell must be charged, and the electrolyte replenished with distilled water, the electrolyte being changed every nine or ten months. No other attention is needed. The battery is inclosed in a locked case and a flexible cord connects it with the lamp. This cord cannot be disconnected and is covered at both ends by flexible steel armor for a part of its length. Danger of sparking by breaking at the connections is thus avoided.

The lamp itself has a tungsten filament and a parabolic reflector protected by a heavy glass lens, cushioned on gaskets. There is also a hook for attaching the lamp to the cap. The miner cannot get at the lamp without breaking a seal on the reflector.

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Pittsburgh Greatest Fuel Consumer

More fuel is consumed in the city of Pittsburgh and its immediate vicinity, and more coal is shipped to and through the Pittsburgh district, than in any other district in the world, according to the U. S. Geological Survey. With a population of about one-ninth of that of Greater New York, the consumption of coal alone in Pittsburgh is nearly equal to that of the much larger city. Greater New York consumed in 1911 approximately 19,000,000 short tons, and Pittsburgh used about 16,500,000 short tons. But Pittsburgh consumes several

million tons of coke and considerable quantities of natural gas, which, added to the coal consumption, gives that city a good lead over New York as a fuel consumer.

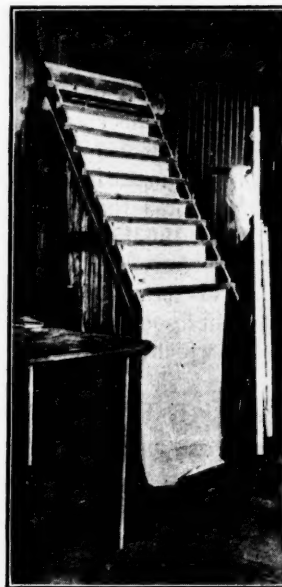
In the quantity of coal handled the comparisons are still more striking, Pittsburgh's business exceeding that of New York by nearly 50 per cent. In 1911 the total coal traffic in New York Harbor, including the city consumption, the trans-shipments to New England and up-river points, and the bunker and export trade, amounted to approximately 36,000,000 short tons, whereas the coal traffic of Pittsburgh, including rail shipments east and rail and water shipments west, amounted to nearly 53,000,000 tons.

In the total movement of coal to Pittsburgh and points east and west thereof, there was an increase in 1911 of 1,974,795 tons over 1910, all of the increase being in the shipments through or from the district. On account of the depression in the iron and steel trade, the local consumption of coal at Pittsburgh decreased about 1,250,000 tons, or from 15,600,654 tons in 1910, to 14,349,644 tons in 1911. The rail shipments to Pittsburgh decreased about 1,000,000 tons, and the water shipments about 250,000 tons. The decrease in the consumption of coke was, of course, much larger. The movements of coal both east and west, however, showed increases, western shipments increasing from 24,453,581 tons to 25,291,264 tons, all in water shipments to lower Mississippi River points, and eastern shipments, all-rail, increasing from 10,781,544 tons to 13,169,866 tons. The water shipments were the largest since 1907.

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Blueprint Rack

The filing and handling of blueprints in a mine office often becomes a troublesome problem. The accompanying illustration, from *Engineering News*, Jan. 23, 1913,



A BLUEPRINT RACK

shows a rack that has proved useful in such cases. The prints are assembled in convenient groups, and bound together with softwood strips, $\frac{1}{4} \times \frac{1}{4}$ in. in section, fastened by $\frac{3}{8} \times 1$ -in. machine screws and wing nuts.

EDITORIALS

A Bill to Amend the Bituminous Mining Code

A bill of a proposed amendment to Secs. 3, 5 and 6, Art. 19, of the bituminous mining code, of Pennsylvania, has just been received. The bill is to be presented to the next legislature. Practically, it covers two important points, in the bituminous code, relating to the appointment of mine inspectors in the bituminous district of Pennsylvania. We give below the reading of these sections as they appear in the present law, together with the changes contemplated in the amendment. Section 3 reads as follows:

SEC. 3. The qualifications of candidates for the office of inspector shall be certified to the examining board, and shall be as follows:

The candidates shall be citizens of Pennsylvania, of temperate habits, of good repute as men of personal integrity, in good physical condition, and shall be [between the ages of thirty and fifty years: Provided, however, that any inspector appointed under the provisions of the act of May fifteen, one thousand eight hundred and ninety-three or under the provisions of this act, shall be eligible for reappointment, even if beyond fifty years of age, if in good physical condition.] The candidates shall have a knowledge of the different systems of working coal seams, and shall have had at least ten years' practical experience in bituminous mines, five years of which, immediately preceding their examination, shall have been in bituminous mines of this commonwealth, and shall also have had practical experience with explosive gas and other dangerous gases found in coal mines; and, upon examination, shall give evidence of such theoretical as well as practical knowledge and general intelligence respecting mines and mining, and the working and ventilation of mines, as will satisfy the examining board of their capability and fitness for the duties imposed upon inspectors of mines by the provisions of this act.

The amendment to this section proposes to omit the words of the section inclosed in brackets and substitute therefor the words: "*at least thirty years of age.*" No other change is suggested in this section.

Section 5, of the present law, reads as follows:

"SEC. 5. The Governor shall, from the names certified to him by the Examining Board, commission one person to be inspector for each district, in pursuance of this act, whose commission shall be for a full term of four years from the fifteenth day of May following the regular examinations. (X) Each inspector appointed under the provisions of the act of May fifteen, one thousand eight hundred and ninety-three, may continue in office until May fifteen, one thousand nine hundred and thirteen.

After the passage of this act, the chief of the Department of Mines shall have the right to assign the inspectors to the districts for which, in his opinion, they are best fitted.

The proposed amendment is to insert at the point marked (X) the following: "*Applicants or candidates whose names have been so certified shall be chosen and commissioned in the order of rank of percentage attained at the examination held by the examining board, the higher to be first preferred over those of lower percentage, and, in case of a tie in percentage, the candidate or applicant oldest in point of service shall be preferred.*"

No other change is contemplated in this section.

Section 6, of the present law, reads as follows:

"SEC. 6. When a vacancy occurs in said office of inspector, the governor shall commission, for the unexpired

term, [from the names on file in the Department of Mines, a person who has received an average of at least ninety per centum. When the number of candidates who have received an average of at least ninety per centum] shall be exhausted, the governor shall cause the aforesaid examining board to meet for a special examination, and examine the persons who may present themselves for examination in accordance with section three of this article, and the board shall certify to the governor, also to the chief of the Department of Mines, the names of all applicants who have made a general average of at least ninety per centum in said examination, as provided for in section four of this article; one of whom shall be (X) commissioned by the governor, according to the provisions of section five of this article, for the office of inspector for the unexpired term. In conducting the said special examination the board shall comply with all the requirements of section three and four of this article."

There are two proposed changes in this section. The first is to substitute for the words inclosed in brackets the following: "*one from those whose names have been certified by the examining board. The choice of the one to be thus commissioned shall be made in the order of the rank of percentage attained by applicants or candidates, at examinations held by the examining board, the higher to be first preferred over those of lower percentage; and, in case of a tie in percentage, the candidate or applicant oldest in point of mining experience shall be preferred. When the number of candidates or applicants, whose names have been certified to the governor and the chief of the Department of Mines by the examining board.*"

The second proposed change is to insert at the point marked (X) the following: "*chosen in accordance with the rank of percentage attained, at such examination, the higher to be first preferred over those of lower percentage, and, in case of tie in percentage the candidate or applicant oldest in point of mining experience to be preferred, and shall be.*"

No other change is contemplated in this section.

* * * *

Referring briefly to these proposed changes, the limitation of "fifty years," provided by the new bituminous law (1911), is a wise safeguard against making eligible for appointment as mine inspectors, men of mature age who have passed the fifty mark and whose habits and opinions have quite generally become fixed. Men of this type, while possessing experience in certain fields and under certain conditions, are often prejudiced in their ideas and convictions. They have, as a rule, passed the age when they can readily adapt themselves to new conditions, which is one of the most important requirements in the qualifications of a mine inspector.

It is very proper, as the present law provides, that any mine inspector who has passed this age limit (50 years) shall be and is still eligible for reappointment to the office he has filled acceptably. His acquaintance with the conditions existing in the mines he is to inspect places him in another class from men who have had no experience as inspectors in the district. We would not, therefore, indorse the proposed amendment of Sec. 3.

The proposed amendments of Secs. 5 and 6 have, each, practically the same purpose in view; namely, to require the appointment by the governor, of that candidate who

has secured the highest percentage in the examination. According to the present law, the governor may appoint, as inspector, any one whose name appears on the certified list furnished him by the examining board.

As claimed by the advocates of this amendment, the present law places the inspector at the mercy of politicians, and has a tendency to make him part of the political machine. In support of the amendment, it is stated that the purpose of the law—the protection of life, health and property—requires that the men appointed to inspect the mines shall be free to perform this work unhampered by any political considerations and without fear of punishment, such as can be administered, by corporations, upon those who oppose their will.

These reasons appeal to the unprejudiced mind as being sound and furnishing sufficient excuse for the proposed amendment of both Secs. 5 and 6. We hope, therefore, that these two sections of the present law will be amended, in this respect.

✱

Self Ignition of Coal

Rabid dogmatism has marked the discussion of spontaneous combustion. The advocates of the theory that iron pyrite or marcasite are the cause of this action have been unsparing of those who favor the belief that oxygenation of the coal substance is the real incendiary.

The promising suggestion and enlightening experiments of H. C. Porter, of the Bureau of Mines, that hydration may be the cause is worthy of careful consideration and he will fortify it if he can show that the coals, most subject to spontaneous ignition, heat more when exposed to hydration than coals which are not so subject.

This, M. Taffanel has shown, is true to a large degree for oxygenation. The coals of Liévin, Béthune and Lens containing 29, 14 and 12 per cent. of volatile matter respectively, on an ash-free analysis, absorbed at 60 deg., 2.90, 1.35 and 1.12 c.c. of oxygen per gram of coal. However, the coal from Nœux with 20 per cent. of volatile matter absorbed less oxygen than any of the others.

We wish to submit a working hypothesis for the consideration of our readers. It is based partly on the fact that the heat of combustion of the coal as an organic unit is almost identical with the heat which would result from the burning of its elements, omitting all that hydrogen from the calculation which may be considered as combined with oxygen to form hydrates or moisture. This fact suggests that if coal could be dissociated, the sum of the heats of the resulting chemical actions would be zero, the dissociation producing a number of calories equal to those which it absorbs.

If it be fair to argue on this basis, we must be convinced that the chemical dissociating actions which produce heat must be considerable. We know that some of the hydrocarbons will generate heat in breaking up, but whether any of them will produce enough to create the balance to which we have referred is at least doubtful.

We are inclined, therefore, to regard as significant the fact that sulphur and nitrogen are found in larger proportions in those types of coal which ignite spontaneously and that they are also components of compounds which create much heat on dissociation. It seems to take much energy to make sulphur or nitrogen mate with carbon; conversely their separation produces much heat.

The heat resulting from dissociation of a pound of cyanogen is 2273 B.t.u. and of hydrocyanic acid 1831. This assures us that at least some compounds of carbon and nitrogen are able to give out much heat on dissociation. The compounds of carbon with sulphur are perhaps fairly represented by carbon disulphide which on dissociation surrenders 1062 B.t.u. per gram of the liquid.

But these are compounds, which may not be found in coal, at least, in chemical freedom. They may be expected to be present in combination with other radicles. Most representative of the class of bodies, likely to be thus found in coal which has not been subjected to much heat, is oil of mustard, a truly organic body, $C_3H_5.NCS$, containing 826 B.t.u. per pound of the liquid. If 3 per cent. of sulphur in the coal were combined as oil of sulphur, the whole body of that compound would represent 9.3 per cent. of the mass of the coal. In many coals 3 per cent. is sulphur which is neither in a sulphate nor in a metallic sulphide and this sulphur probably forms compounds analogous to the oil we are discussing.

It is true that the oil of mustard itself is probably not to be found in coal, nor yet are any of the compounds mentioned, but it is certain that other hydrocarbons combined with sulphur and nitrogen are to be found and thermochemical inference suggests that they might be equally heat-giving on breaking up to simpler forms. Moreover, experience favors the suggestion that the sulphur, at least, will be ready to break loose from its union with organic bodies.

Hence we have suggested a chemical action which is probably most active in coals still in formation, and which is independent of oxygen. Such an action can take place in the heart of a coal pile and here it is that spontaneous combustion commences. But we do not explain by this hypothesis why coal is most subject to this action after it has been exposed to the air nor are we able to show why hydration increases the heat of the coal mass. But these are not sufficient objections to our assumption.

It is likely that hydration, dissociation and the oxygenation both of coal and pyrite all do their part and may help one another. The taking of the coal from the hill, not only oxidizes it, but removes the water which apparently is in chemical union with the coal, for otherwise its reunion would hardly be accompanied with so much heat.

This oxidizing and dehydration may possibly aid in the breaking up of the original compounds in the coal. In fact, there are reasons for thinking dehydration is more effective in American coals than oxidation because coals left in the mine, subject only to the latter, rarely take fire. Their desiccation is prevented by the subterranean moisture.

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Educating the Coal User

When we recall that the early anthracite coal producer expended his money to find some means of burning anthracite in a stove, when we note with what ability the Standard Oil Co. has taken over the oiling of cars and engines, when we pass exhibitions of the gas companies in the big cities striving to show how light and heat can be more economically obtained from gas than from electricity or coal respectively, we wonder why the operator having a waste grade to sell, tries to make the market accept it only by a price differential.

SOCIOLOGICAL DEPARTMENT

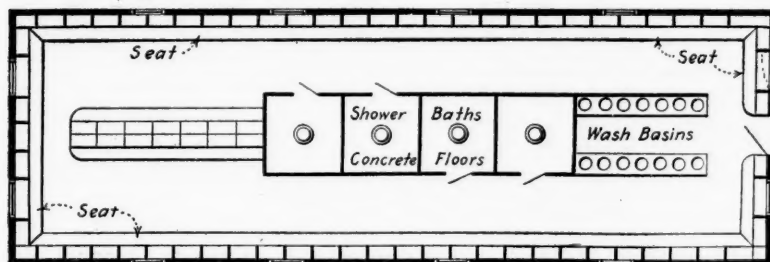
A Kentucky Bathhouse

SPECIAL CORRESPONDENCE

The bathhouse for the use of coal miners is not an innovation. In the older mining communities it is as much a part of the equipment of the modern mine as the tippie, the machine shop and the power plant, but in Kentucky, and especially in the mountain district, it is not often to be found.

The Stearns Coal & Lumber Co., when it attempted to improve the condition of its miners, by erecting a "washhouse" for their use, did so with some misgivings. It is rather a delicate subject to approach, to suggest that any man would feel better if he had a bath once a day, and miners, as a class, are sensitive, especially when it is the "company" which does the suggesting.

The first experiment, for it was so considered, was at Mine No. 4, which employs about 200 men. A simple wooden building was constructed, with 60 lockers, four showers and about a dozen basins, over which were hot and cold-water faucets. It was heated by a stove, and electric lighted. The water was piped from a reservoir and heated by an old portable boiler.



THE BATHHOUSE BUILT BY THE STEARNS COAL & LUMBER CO. AT NO. 10 MINE

The problem of maintaining the bathhouse was a serious one, for an attendant night and day was required. It was solved by charging all who used a locker 50c. per month, and all other employees at the mine 25c. per month "whether they needed a bath or not." There was considerable opposition to this at first, but the miners soon realized the advantages and were willing to pay for them. As the arrangement stands, the "company" furnishes the building, equipment, water, light and fuel, and the miners pay the other running expenses. This means of maintenance seems based on sound business principles. Luxuries that cost nothing are not usually appreciated.

NINETY PER CENT. OF THE EMPLOYEES PETITION FOR A BATHHOUSE

In a short time the miners at No. 10, a larger mine belonging to the above company, sent a petition, signed by no less than 90 per cent. of their number, asking for a bathhouse on similar terms. The plan shown herewith will give an idea of the one which was constructed in answer to their request.

It is larger than that at mine No. 4, containing 100 lockers. It has four showers with concrete floors. It is

steam heated and is lighted by electricity. No lockers are placed over others and all are of such height as will receive a full suit of clothes without folding. Holes are bored in the doors for ventilation. A motor-driven pump and a 10,000-gal. tank provide water during continued dry weather; at other times water will be piped from hill-side springs.

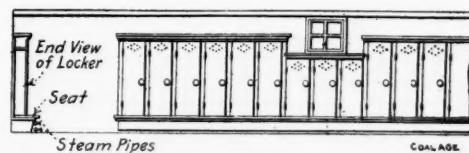
Possibly the principal beneficiary of the miner's bathhouse is the housewife; but the miner derives much comfort from it, since it permits him to leave his working clothes at the mine, where they belong, and appear on trains, in the office, at the commissary and at home in apparel befitting the well-to-do workman.

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Prizes for Efficiency

The Corona Coal Co. and H. B. Swoope & Co., who operate 10 mines in Clearfield County, near Madera, on the Pennsylvania and New York Central & Hudson River railroads, recently initiated a scheme for increasing the efficiency of their employees by the giving of prizes to those who showed themselves willing to do good service. The

0' 3' 6' 9' 12' 15'



tonnage of the combined mines is about 500,000 tons per annum.

They promise to give, about Apr. 1, fifty cash prizes, and the awards will be made by a committee to consist of the general manager, mine superintendent, engineer and mine foremen. The prizes will run from \$1 to \$20 and the time to be considered in the award commenced Nov. 18, 1912, and extends to the time of distributing the prizes. All employees, regardless of where they may work, are eligible for a prize, except the members of the committee. However, the mine foremen receive extra pay for the above mentioned period if they make a good record.

OPEN TO ALL EMPLOYEES

Without limiting the nature of services for which rewards will be made, the general manager has outlined certain possible conditions which will find favor with the committee. A miner who works faithfully every day if possible and loads as much coal when the company needs it as he reasonably can and always tries to keep his coal clean, and who endeavors to help out the mine foreman by getting him miners and in other ways, will be a suitable recipient for one of these prizes.

A cutter and his scraper who systematically keep their places cut, and who see that there is somebody to replace them if they have to be away, will be favorably considered by the committee in the making of awards. A driver who works hard and uses good judgment, making as many trips as possible, who takes good care of his mules and encourages the men whose coal he hauls, who suggests improvement in the method of hauling or gathering coal, and who helps to get miners when they are scarce, will be in line for an award of merit.

ENCOURAGEMENT TO WORK OVERTIME

An employee on the tippie who keeps the tippie floor clean, who helps the motorman or driver to get away quickly with his trip, who loads out a railroad car after hours so that it will not stand over, who watches for the dirty coal and hustles for the company's interest, will be remembered when the distribution of prizes is made.

Motormen, trip riders, and team drivers who make an early start in the morning and a good tonnage each hour, remembering to be careful at the same time, who get in an extra trip now and then, and who are not afraid of an extra trip in the evening, particularly if needed to finish the end of a railroad car when cars are scarce, or any other employee in the boiler house, blacksmith's shop, on the road, or in the barn, who keeps the work moving will probably be rewarded for his activities in the interest of the company.

In short, 50 cash prizes will be given to the 50 men in the employ of these two companies who are of the most value to the corporations between Nov. 18 and Apr. 1. It will be interesting to see what effect this award will have on the efficiency of the employees. It is openly admitted that it is based on the practices in vogue in the Pennsylvania R.R. and the U. S. Steel Corporation. However, it is not necessary to point out that there are certain important differences in the character of the aims.

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Precautions Taken by the Frick Co.

By THOMAS W. DAWSON*

To warn the enginemen, machinists and others, the following notice is posted: "Employees working around engines, moving or revolving machinery, shafts, etc., are warned of the danger, and are prohibited from wearing torn clothing, loose or unbuttoned jackets, blouses, shirts, long neckties and loose sleeves. Always wear the overall jacket, tucked in the trousers or under the overall bib. Never forget to examine your clothing before commencing work." There is also the sign, "Stop this machine before oiling, wiping or repairing."

By way of safety devices, there are safety guards for all smith-shop equipment, saws, lathes, emery wheels, gears, belts, pulleys, shafting and all wood- and steel-working machinery; a locking device for handwheels on valves; safety lock for electric switches; guards for water gages; concealed setscrews; safety gaskets to be inserted in steam blowoff and feed-water connections when cleaning and repairing boilers; safety-locking device for self-dumping cages; safety chucks for drill-press spindles; safety chuck for engine lathes; safety lock for belt shifter, guards for governors and governor pulley wheels; spark

*Assistant chief engineer, H. C. Frick Coke Co., Scottdale, Penn.

Note—Abstract from paper entitled "Welfare, H. C. Frick Coke Co.," read before the winter meeting of the Coal Mining Institute of America, Dec. 18, 1912. Continued from our issue of Jan. 25, 1914.

arrestor for charging locomotives; soap lubrication for air compressors; wagon guard and dumping platform for swing-gate mine wagons; spooling device for tail rope on haulages; stiles or protected crossings over rope and sheaves where necessary for men to pass; improved safety catch for cages; device for positively rectifying wagon catches on car hauls; self-closing hinges for shaft gates; steel gallery and runway over boilers; protecting railing of all kinds around the revolving and moving parts of all machinery, and around drum pits, sumps, waste-heat flues, etc.; safety platform for operation of electric larries; extra cages ready to replace shaft cages for use in case of accident; rubber matting around all switchboards and electrical machinery; and printed rules and regulations for the proper care of all moving parts.

"Do Not Touch" signs are used about electricity, indicating the voltage of the current; and "Do Not Pass Under" signs will be found at such places where there is danger in passing underneath structures.

NOTICES UNDERGROUND

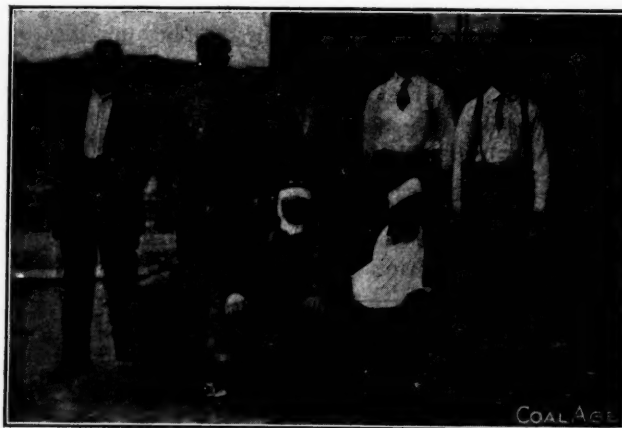
When coal is hoisted, you will see a sign in large letters indicating the maximum load which may be placed on the cage, and the gross weight which that rope will support. The standard signals for the hoisting and lowering of cages or trips, and the number of men permitted to ride on a cage at one time, are indicated by signs having large letters, placed at the most convenient points for observation.

We have steel doors to drop over shafts which have wood headframes or coal bins above them, in case these wood structures catch fire; pits for reception of blowoff pipes from boilers, to prevent accidents to anyone who might be passing during their blowing off; and "drags" or "dogs" on the rear end of all trips hoisted on inclines or slopes.

A thorough search is made of one man or more of each cage load which is lowered into a mine generating gas, to discover matches or smoker's articles. All safety lamps are inspected thoroughly at the lamp house each morning immediately before they are given to the employees.

(To be continued in an early issue)

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WINNERS OF VICTOR AMERICAN FUEL CO.'S SILVER CUP
AT GIBSON, N. M. FROM LEFT TO RIGHT: DR. J. W.
STOVER, R. W. DENNARD, T. KUZNIAR, J. KACER,
AND F. KUZNIAR. SUBJECTS, V. KOMENDA
AND P. McDERMOTT

DISCUSSION BY READERS

Reducing Ventilation When Firing

Letter No. 9—I have been much interested in the discussions on reducing ventilation in mines at firing time. It seems to me that it would not be right to stop the fan or reduce the ventilation when firing in a mine that is making any gas at all, for at least two good reasons: 1. The continued flow of gas into the mine would soon produce a dangerous atmosphere if the fan were to be stopped or the ventilation checked. 2. The gases produced by the firing of a large quantity of powder, at the working face, must be diluted and swept away by a sufficient current of air, which must be kept traveling.

In the use of dynamite, it often happens that one or more sticks of the charge do not explode; but, being ignited, burn with a blaze. In the use of black powder, much the same result is often produced by a shot blowing its tamping, and much of the powder being thrown out and burning in the air. These occurrences often produce an explosion, if the atmosphere in the mine is not sufficiently diluted with good, pure air. To avoid these occurrences a competent man should inspect all shots before they are fired.

THOMAS R. PIERCE.

Scranton, Penn.

Letter No. 10—I have followed closely all that has been written in COAL AGE, on the subject of reducing or shutting off the air when firing in mines, and from my own experienced, strengthened by the opinions and experiences of some old-time shotfirers, I am convinced that it is safer to fire shots in the mine with the fan stopped, or at least with slack ventilation, than with a strong air current.

I have noticed that a "windy shot" seldom occurs in the first rooms on a long entry where the air is generally poor and there is much room for expansion and plenty of cooling surface. But, as we shoot the rooms in regular order and approach the face of the entry, the space becomes more contracted and the ventilation stronger. In finishing up, at the head of the entry, it is often necessary to light 5 or 6 shots together. These may not all explode at once, but follow each other in quick succession. In this close confined space, the gases produced by the burning of so much powder and distilled from the coal and the fine dust thrown into the air, combine to make a highly explosive atmosphere, which is often ignited by one of the shots, producing what is called a "windy shot," or perhaps a small local explosion.

It is my opinion that if there were no air current here these gases would not explode. Gas will not burn without a certain admixture of air or oxygen. In the absence of sufficient air, flame quickly dies out. This would greatly shorten the range of flame, in blasting, and limit the amount of destruction should a windy shot occur.

It would not be necessary to stop the fan or slow it down, at the time of firing. In order to reduce the ventilation in an entry we are about to shoot, all that is neces-

sary is to short-circuit the air by setting open the door at the mouth of the entry, or at a point outside of where the firing begins. This will leave the section we are about to shoot unventilated and accomplish the same purpose as stopping the fan. Such a question as this I think is worthy of the attention of the Federal Bureau of Mines and should be thrashed out at the Pittsburgh experiment station.

R. J. PICKETT.

Shelburn, Ind.

Letter No. 11—It has been generally admitted that firing shots against a high-water gage is dangerous, but to what extent has never been thoroughly settled. The opportunities for studying the problem are limited and we must therefore depend largely on theory.

In considering the question of reducing the ventilation in a mine at firing time, in its practical bearing, and ignoring for the time the possible effect of a high water gage or pressure, we must first ask: Are shots fired in absolutely still air dangerous and, if so, why? Personally, I maintain that in the majority of cases they are dangerous and the danger is greater in a gassy mine.

The argument in favor of shooting in still air appears to be that if the ventilation is stopped there will not be enough available oxygen to support an explosion if one should start. But, let us see if such is really the case. For example, say the day shift in a mine goes off at 4 p.m. and the shotfirers going down an hour later stop the fan. Allowing them time to get to the nearest working face, perhaps an hour will elapse from the time of stopping the fan until firing of shots begins. No change could take place in the atmospheric conditions, in this time, that would warrant our saying that an explosion could not occur, the fan having been stopped? In mines generating no gas the condition of the air is practically unchanged, except for a slight reduction in pressure, owing to there being no circulation. The oxygen content of the air has not been appreciably diminished by any chemical action, in so short a time. There is, then, but one difference; namely, the air is at rest instead of in motion and there is no ventilating pressure.

Let it be assumed that this condition exists in a mine that is dry and dusty, and that three shots are fired in the face, by fuse. What will be the result? It is practically impossible for a shotfirer to cut the fuses so that these shots will explode at the same time, but they will probably follow each other in quick succession. The first shot will cause a rush of air and dust away from the face, which will probably react or rebound about the time another shot goes off; and this may be repeated, each shot throwing more dust into the air, which soon becomes thoroughly dust-laden. If, now, one of the shots happens to be overcharged and blows its tamping, producing considerable flame, the resulting conditions are ripe for a dust explosion. Such an explosion, feeding on the oxygen of the air, will seek the lines of least resistance, regardless of whether the air is still or in motion.

I believe it is unnecessary to discuss this question, in respect to mines making much gas, for the state mining laws generally prohibit the firing of shots in the presence of firedamp, which would be sure to be present in any mine making gas.

I would like to ask what mine foreman, in charge of a mine generating large quantities of gas, would dare to stop his fan for 30 min. or an hour before the shortfirers go into the mine. It would be necessary to make an examination of each place before firing a shot therein, in order to make sure that no gas had accumulated while the fan was stopped. I think few, if any, firebosses would try such a caper. One would be liable to lose his certificate, in almost any state, if he did.

Ventilation in the mines may, of course, be carried to an unreasonable extent. A strong air current may increase the tendency of the air to rush back, after a windy shot; but if a given amount of air is required, at the working face, to dilute the inflammable gases generated, the same amount or more must certainly be kept in circulation during firing time when a deficiency of oxygen would result in producing a larger amount of inflammable gas (CO) from the explosion of the powder.

The more logical thing to do is to insist on rigid shot inspection; mine the coal wherever possible; and use permissible powders, with an electrical firing system operated from the surface. If this is done it will make little difference whether the air is still or moving.

As long as coal is shot by black powder and the holes are charged as some miners see fit, with no regard to the position or depth of the hole, there will be a good chance of explosion, no matter what steps are taken in regard to the ventilation of the mine.

O. G. SHARRER.

Hanna, Wyo.

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The Bellevue Mine Explosion

Referring again to the discussion of the cause of the second explosion at Bellevue, Alberta, Canada, which occurred Dec. 9, 1910, I have been hoping that there would be a further discussion of the important questions involved and which have been referred to in the Stirling-Cadman discussion, *COAL AGE*, Oct. 5, p. 457; and my own letter, Nov. 2, p. 617.

The verdict of the jury reads in substance as follows:

We do upon our oath say that 30 men came to their death by carbon-monoxide poisoning, and one by a combination of carbon-monoxide poisoning and a fractured skull caused by a cave of rock in chutes Nos. 76 and 78.

This evidence was based on the percussive theory as advanced by James Ashworth, mining engineer, who was called by the government to give expert evidence on this disaster. The question arises as to whether a fall of roof rock, without an explosion of gas and dust, or either, in a coal mine, could generate heat sufficient to coke the dust so as to form minute globules of coke, char the timber, blow out stoppings and do other damage, besides generating large volumes of afterdamp containing carbon monoxide. According to the expert evidence given by Mr. Ashworth, all of these effects were caused by the percussive effect produced by the heavy cave of roof rock in the chutes mentioned.

If we understand correctly, Mr. Ashworth discards the ignition of a possible accumulation of firedamp or a

cloud of dust by sparks from the falling rock, and ascribes all to the percussive effect produced on the mine air by the fall of roof; assuming that the compression of the air in the mine was sufficient to generate the heat necessary for the effects just named.

Others claimed that a body of gas and more or less dust was ignited by sparks, given out by the roof rock striking the iron chutes or in the grinding action of the roof as it fell. The discussion of these possible causes has created much interest among miners and mining men in general, throughout the Crow's Nest Pass; and we would gladly see the question further discussed.

J. W. POWELL,

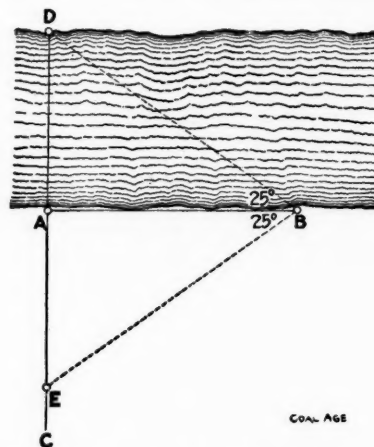
Mine Manager, Columbia Coal & Coke Co.
Coalmont, B. C., Canada.

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Surveying Methods

Referring to the question of Mine Surveyor, *COAL AGE*, Jan. 18, p. 113, I would like to suggest another method that has served my purpose on several occasions. This method is a very convenient one to use in a level country, although it could not be applied, in many cases, where the country is rugged and there is not sufficient room to extend the line. It possesses the advantage that it requires no technical knowledge on the part of the surveyor, or any calculation.

The method is as follows: Referring to the accompanying figure, set up the transit at *A*, on the edge of the



SIMPLE METHOD OF MEASURING ACROSS A RIVER

stream, and sight the telescope on some well defined object *D*, on the other side of the river. Then plunge the telescope and extend the line *DA* to *C*.

Now, deflect 90 deg. from the line *DC*, and locate a point *B* so that the line *AB* is at right angles to the line *DC*. It is not necessary to measure the distance *AB*, which can be any convenient distance. Set up the instrument at *B*, sight the point *A*; and, having first set the vernier at zero, deflect the telescope to *D*, and read the vernier. Now, sight again to *A*, with the vernier set at zero, and turn off the angle *ABE*, equal to the angle *ABD* just measured. In the figure, these angles are marked 25 deg., but may be any other angle. The point *E* must be located on the line *AC*. The distance *AE* will then be equal to the required distance *AD*; and this distance *AE* can be measured with the tape or chain.

Carbon, W. Va.

EMIL F. HOCKE.

EXAMINATION QUESTIONS

Ventilation

(Answered by Request)

Ques.—A certain fan, at a certain mine, produces 65,000 cu.ft. of air per min., when running at 40 r.p.m.; what volume of air will this fan produce at the same mine when running at a speed of 55 r.p.m.?

Ans.—For the same power applied and the same conditions in the mine, the volume of air produced is, practically, proportional to the speed of the fan. In other words, the quantity ratio is equal to the speed ratio, therefore, calling the required volume of air x ,

$$\frac{x}{65,000} = \frac{55}{40} = \frac{11}{8}$$

$$x = \frac{11}{8} \times 65,000 = 89,375, \text{ say } 90,000 \text{ cu.ft. per min.}$$

In practice, the increase of quantity is in a slightly less ratio than that of the speed. For example, the fifth power of the quantity ratio is equal to the fourth power of the speed ratio. Thus,

$$\left(\frac{x}{65,000}\right)^5 = \left(\frac{11}{8}\right)^4 = 1.375^4$$

$$x = 65,000 \sqrt[5]{1.375^4}$$

$$x = 65,000 \times 1.29 = 83,850 \text{ cu.ft. per min.}$$

Ques.—If 70,000 cu.ft. of air is passing through a fan drift per min., under a water gage of 2.1 in., what is the horsepower on the air?

Ans.—The horsepower on the air or the effective horsepower is

$$H = \frac{Qp}{33,000} = \frac{70,000 (5.2 \times 2.1)}{33,000} = 23.16 \text{ hp.}$$

Ques.—If a certain power is passing 30,000 cu.ft. of air per min., in an airway 6x6 ft., what would be the size of a similar airway that will pass 40,000 cu.ft. per min., under the same power, assuming the airways are of equal length.

Ans.—In similar airways of equal length, for the same power on the air, the fifth powers of similar sides bear the same ratio to each other as the cubes of the quantities of air in circulation. In other words, the fifth power of the side ratio is equal to the cube of the quantity ratio. Therefore, calling the side of the required airway x , we have,

$$\left(\frac{x}{6}\right)^5 = \left(\frac{40,000}{30,000}\right)^3 = \left(\frac{4}{3}\right)^3 = \frac{64}{27} = 2.37$$

$$x = 6 \sqrt[5]{2.37} = 6 \times 1.188 = 7.128 \text{ ft.}$$

The size of the required airway is, therefore, 7.128 x 7.128 ft. The sectional area of this airway is 7.128 x 7.128 = 50.8 sq.ft.

Ques.—A current of 25,000 cu.ft. of air is split so that it travels in three airways subject to a common pressure. The size and length of the airways are as follows: Split A, 6x9 ft., 2100 ft. long; split B, 6x10 ft., 2400 ft. long; split C, 4x10 ft., 9000 ft. long. How will this quan-

tity of air divide between these three splits if no regulators are employed?

Ans.—The area, perimeter and length of each of these airways are as follows:

A,	$a = 6 \times 9 = 54 \text{ sq.ft.};$	$o = 2 (6 + 9) = 30 \text{ ft.};$	$l = 2100 \text{ ft.}$
B,	$a = 6 \times 10 = 60 \text{ sq.ft.};$	$o = 2 (6 + 10) = 32 \text{ ft.};$	$l = 2400 \text{ ft.}$
C,	$a = 4 \times 10 = 40 \text{ sq.ft.};$	$o = 2 (4 + 10) = 28 \text{ ft.};$	$l = 9000 \text{ ft.}$

Reduced, the lowest relative values are as follows:

A,	$a = 27;$	$o = 15;$	$l = 7$
B,	$a = 30;$	$o = 16;$	$l = 8$
C,	$a = 20;$	$o = 14;$	$l = 30$

The relative split potentials are now found by substituting these relative values in the expression for potential,

$$X = a \sqrt{\frac{a}{lo}}$$

as follows:

$$A, 27 \sqrt{\frac{27}{7 \times 15}} = 27 \sqrt{\frac{9}{35}} = 27 \sqrt{0.2571} = 13.690$$

$$B, 30 \sqrt{\frac{30}{8 \times 16}} = 30 \sqrt{\frac{15}{64}} = 30 \sqrt{0.2344} = 14.524$$

$$C, 20 \sqrt{\frac{20}{30 \times 14}} = 20 \sqrt{\frac{1}{21}} = 20 \sqrt{0.0476} = 4.363$$

$$\text{Sum of potentials} \dots\dots\dots 32.577$$

The quantity of air passing in each split is proportional to the split potential, and is found as follows:

$$A, Q_a = \frac{13.690}{32.577} \times 25,000 = 10,500 \text{ cu.ft. per min.}$$

$$B, Q_b = \frac{14.524}{32.577} \times 25,000 = 11,150 \text{ cu.ft. per min.}$$

$$C, Q_c = \frac{4.363}{32.577} \times 25,000 = 3,350 \text{ cu.ft. per min.}$$

$$\text{Total} \dots\dots\dots 25,000 \text{ cu.ft. per min.}$$

Mensuration

Ques.—(a) What is the volume of a conical tank 8 ft. in diameter at the top, 9 ft. in diameter at the bottom and 10 ft. high? (b) How many gallons of water will this tank hold?

Ans.—(a) Calling the large diameter D , the small diameter d , and the height h , the volume of the tank is found by the following formula:

$$Vol. = \frac{0.7854 h}{3} \times \frac{D^3 - d^3}{D - d}$$

Substituting the given values, the volume of the tank, in this case, is

$$Vol. = \frac{0.7854 \times 10}{3} \times \frac{9^3 - 8^3}{9 - 8} = 2.618 (729 - 512) \\ = 2.618 \times 217 = 568.1 \text{ cu.ft.}$$

(b) The capacity of this tank in gallons is found as follows:

$$\frac{568.1 \times 1728}{231} = \text{say } 4250 \text{ gal.}$$

COAL AND COKE NEWS

Washington, D. C.

A statement made upon what appears to be good authority among Democratic members of Congress is to the effect that coal which is now dutiable under the Payne-Aldrich law will, in the forthcoming tariff reform measure, be shifted to the free list. The hearings before the committee are now finished, although briefs relating to various items are still being received.

Coal producers have not made any vigorous arguments before the committee recognizing as they apparently do the disposition to abolish the present rates, in the interest of the consumer and thereby to afford such relief as transportation conditions would permit.

It is the expressed view of Democrats that the coal section in the Canadian reciprocity bill for which practically all Democrats voted clearly committed the party to the idea of free trade in coal. They do not think that general free trade in this commodity would be more injurious to the domestic miner than free trade with Canada would have been, and while the Canadian bill did not provide for absolute free trade with that country in this item it did take a decisive step in that direction.

Another feature of the situation which has received considerable attention is the fact that the duties on various classes of manufactures are being materially cut and that under those conditions Congress ought to relieve the manufacturer of such increase in price as the coal duty necessitates. This is supposed to be particularly important to manufacturers in the Northwest.

An Important Decision

The Interstate Commerce Commission has rendered an important decision in the Louisville & Nashville coal and coke rates case. This proceeding involved the reasonableness of proposed increases on coal and coke from mines east of Middlesboro, Ky. It was sought to advance the rates on coal to the Ohio River and points south thereof 25c. per ton while the advance on coke was 30c. per ton north of the Ohio River. The Commission now finds that the defendants (the railroads) have not succeeded in establishing the reasonableness of the new rate and, therefore, the tariffs are ordered withdrawn, the present rates being continued. Incidentally the commission expresses some interesting opinions on methods of discussing the rate question and gives the following useful summary of this important controversy:

Briefly summed up the record shows, among other things, the following: (1) That the Louisville & Nashville encouraged in every proper manner the development of the mines and ovens in the St. Charles and Appalachia districts, assisting those operators in establishing a market north of the Ohio River; (2) That the present rates have been in effect nearly ten years and the advance contemplated will probably exclude the Virginia operators from the northern territory; (3) That the cost to the Louisville & Nashville for transporting coal and coke via Cincinnati is not fairly representative of the cost via that route because of substantial expenditures incident to improvements under way; (4) That via Louisville the cost to the Louisville & Nashville is materially less than via Cincinnati; (5) That according to the Louisville & Nashville's figures the cost to it equals or exceeds its revenue, while according to the commission's figures the cost is only from 71 to 82 per cent. of the revenue; (6) That these costs include all costs except return upon income account, the out-of-pocket cost being, therefore, even at the Louisville & Nashville's figures, about 60 per cent. of its revenue; (7) That the Louisville & Nashville system as a whole is prosperous, that its Cumberland Valley division as a whole is prosperous, that the portion of the Cumberland Valley division east of Middlesboro shows either a profit or a loss dependent upon the method used in the assignment of cost and revenue; (8) That the eastern half of the Cumberland Valley division is more expensive per unit of freight to operate than the western half because for ten years it has remained practically unimproved and a much more economic line could be secured from Wassila to Appalachia; (9) That while joint rates are under investigation all of the cost and revenue figures relate only to the movement to the Ohio River; (10) That the freight traffic manager of the Louisville & Nashville admits that his road seems to have been "trimmed" by the northern lines in the matter of divisions; and (11) that beyond a few categorical answers there is no testimony tending to show the reasonableness of the increased joint rates in their entirety.

Under all the circumstances our conclusion is that the burden cast by law upon defendants to show the reasonableness of the increased rates has not been sustained and that such rates should not be allowed to become effective. We

are further of opinion and find that the present rates are reasonable and should be continued for a period of two years. An order in accordance with these findings will be issued.

Look for Higher Anthracite Prices

According to reports that are being received by government officials engaged in the investigation of the coal situation, materially higher prices for anthracite coal are to be expected in the near future, unless there should be a reduction in freight rates tending to offset them. As to future demand it is apparently positively assured while, according to information received by the bureau of mines production is about reaching its maximum capacity—a point from which it is certain shortly to recede. This prospect in connection with coal prices is likely to be seriously discussed in connection with the reports to Congress regarding the coal situation that are now in process of preparation.

PENNSYLVANIA

Anthracite

Scranton—It was announced here, Feb. 3, that following a meeting of the directors held in New York, the Erie Railroad Co. has divorced all relations with its coal holdings. Henceforth they will be operated as two separate corporations. The headquarters of the coal department, now located in New York, will be removed to Dunmore, where the offices of the Pennsylvania Coal Co. are now located. F. D. Underwood, president of the Erie, retires as president of all the coal companies that are subsidiary to it. He is succeeded by Captain W. A. May, vice-president and general manager of the coal companies.

Treverton—Treverton and Shamokin locals of the United Mine Workers have adopted resolutions to work on days that colliery employees, who are killed, are buried and to give the widow \$150. If a breaker boy is killed, the parents will receive \$50.

Taylor—As a part of the campaign that has been waged for months in the interest of a 100% organization of mine workers throughout the anthracite field, about 6500 employees of the Lackawanna Coal Co., at eight of its collieries in Scranton and Taylor, quit Feb. 1. They refused to work with nonunion men, engineers being included in this list, the miners insisting that they should belong to the organization.

Pottsville—Two large collieries of the Reading Coal Mining Co. are crippled as a result of the strike of 2200 of their men. The reason is said to be that certain of the employees refused to wear union buttons.

Bituminous

Connellsville—A scarcity of labor has been serious in the eastern Tennessee field since the holidays and, as a consequence, the car supply in that section is exceptionally good. The full output is not being loaded at any of the mines.

It is said that many miners in the Tennessee-Kentucky field left that region shortly before Christmas, owing to the scarcity of cars and the consequent slack work and came to the Connellsville region.

Greensburg—The U. S. Weather Bureau is notifying mine owners throughout the country that it will inform them, if they so desire, of the times when it would be advisable to take extra precautions to prevent explosions and mine disasters. The weather bureau declares that when there is a marked fall in atmospheric pressure the chances for mine explosions are greatly increased.

Carrolltown—Mine Inspector Monteith is conducting an investigation into the explosion in mine No. 25, of the Pennsylvania Coal & Coke Corporation, in which Ferdinand Behe and Paul Steffus, both of this place, were killed, Jan. 23.

WEST VIRGINIA

Bluefield—The visit of D. A. Thomas, head of the Cambrian Syndicate, and one of the most prominent men in the coal trade, has aroused much interest and discussion among coal men here as well as elsewhere. Those who are in a position to know best believe that the interests represented by Mr. Thomas are about to take over the ownership of a considerable portion of the New River-Pocahontas coal fields and that the deal, whatever it is, is already consummated.

Boomer—A vigorous membership campaign has been waged during the past month by the Boomer local of the United Mine Workers. As a result the membership roll has been increased by 3500. At Boomer from 8000 to 10,000 miners are employed in the various mines, who have never had any trouble with the Kanawaha Coal Operators' Association. The union believes that if the Paint and Cabin Creek sections were unionized, the operators in those districts would have no trouble.

Charleston—Delegate W. W. Wertz, of Kanawha, has introduced a bill in the House, changing the present system of privately-employed guards, and prescribing the appointment of special police by the governor.

ALABAMA

Birmingham—A number of the largest coal operators in the district have announced wage increases effective in the near future. Included in these are the Tennessee Coal, Iron & R.R. Co., Pratt Consolidated Coal Co., Alabama Fuel & Iron Co., Eldorado Coal Co., Little Cahaba Coal Co., Blocton Cahaba Coal Co., and others.

The properties of the Southern Iron & Steel Co., bankrupt, were sold on Jan. 31 to the bondholders who will reorganize under the name of the Standard Steel Co. James Bowron, trustee of the bankrupt concern, will be president of the new company.

TENNESSEE

Knoxville—Kentucky operators are interested in the meeting of the Southern Appalachian Coal Operators' Association, which is to be held Feb. 11, at Knoxville. Several addresses of unusual interest are on the program, among them, probably one by Dr. Joseph A. Holmes, of Washington, D. C., head of the U. S. Bureau of Mines.

The association, while an organization now only in its third year, numbers among its members operators who expect during the current calendar year to mine between six and seven million tons of coal, which is much the largest tonnage it has ever enrolled before.

KENTUCKY

Louisville—The slowness of the domestic demand has given rise during the current season to somewhat extensive resort on the part of some operators to the practice of consigning unsold coal to the various markets to their own account. An agent is sent on to sell it or some dealer handles it for them, and, in event of failure to accomplish this, the coal is thrown on the market as demurrage coal. The practice is often followed by tying up of railroad equipment for an unduly long time, and the demoralization of the market.

OHIO

St. Clairsville—Fully 3000 men are out of work as the result of the car shortage. Mines which have box-car loaders are able to operate in full; on the other hand, few mines in Belmont County which cannot load box cars are operating in full. The shortage of flats and gondolas on the railroads has reached a climax during the past two weeks.

Bridgeport—President John Moore, of the Ohio Mine Workers, has arrived to take up the strike of the 400 miners at the Crescent mine of the Lorain Coal & Dock Co. The miners claimed that they were being cheated by the scales. Mr. Moore will also look into other strikes in Belmont County, involving 1500 men.

Coshocton—At a recent meeting of the board of trade of Coshocton, strong resolutions were adopted opposing the proposed anti-screen law, pending in the Ohio General Assembly. It is said that the law, if enacted, would be "inimical to the best public interests of our community."

The resolutions call attention to the fact that Professor Edward Orton, of the department of geology of the Ohio State University, is opposed to the bill.

INDIANA

Terre Haute—On account of high waters, 450 miners are idle in the Clinton field. The Chicago & Eastern Illinois R.R. has been compelled to abandon its mine trains and the men will be compelled to remain idle until the water subsides.

The entire area of the great coal fields west of this city is covered with water.

ILLINOIS

Lincoln—Two miners were killed, two injured and 34 had a narrow escape from being buried alive recently by a huge fall of slate at the Latham mine, near Lincoln.

Benton—The strike of the miners at the Benton Coal Co.'s mine here, which lasted for over a week, ended when the

charter of the Miners' Local was revoked by the state organization. The strike was caused by the coal company fining the employees for refusing to work one day in December last, and the miners' state officials upheld the mining company.

COLORADO

Boulder—The House of Representatives has adopted the Ardourel resolution calling for the appointment of a joint committee from both branches of the legislature to investigate the labor conditions in the north Colorado coal fields. The resolution now awaits the action of the senate.

FOREIGN NEWS

England—English coal trade is extremely unsettled, owing to the fact that it is feared that the miners will cease operations in March.

Alaska—Officials of the Department of the Interior were at Anna, Ill., Jan. 25, to investigate the Hartline coal claims in the Controller Bay region of Alaska. They are in the same section as the Cunningham claims, the title to which has been invalidated by that department.

PERSONALS

H. L. Findlay has been appointed general sales manager of the Youghiogheny & Ohio Coal Co., Cleveland, Ohio, to take effect Feb. 1.

F. R. Wadleigh has opened an office at 1013 Bank of Commerce Building, Norfolk, Va., as consulting engineer. He will specialize on mining reports, purchase and use of railway fuel, coal markets, both here and abroad, handling and analysis of fuel. Mr. Wadleigh has had a rather unusual experience in certain branches of the coal industry, which places him in a position to speak authoritatively on these.

BOOK REVIEW

SIXTEENTH BIENNIAL REPORT OF STATE MINE INSPECTORS TO THE GOVERNOR OF THE STATE OF IOWA. 110 pp., including index; 6x9 in. Cloth bound.

There are only three mines using mules and these are all in Appanoose County. Iowa is one of the safest mining districts in the United States. There are few which can show an accident rate lower than 1.85 per thousand men employed, as Iowa did in the year ending June 30, 1912. The year before, the loss was 2.13. The best record was in 1905, when it was 1.4, and the worst in 1902, when it was 4.2.

The mines are for the most part small. For the first fiscal year of the two considered, only 242 mines were working; the tonnage was 7,729,674, or about 32,000 tons to each mine, that is about 125 tons per day. In the second fiscal year, the number of mines working increased to 260, and the tonnage fell to 6,820,828, but the mines were idle for 60 days, owing to a strike, and after that the work was quite slow for a whole month.

This report covers the coal-mining industry in Iowa for the two years ending June 30, 1912. Marked features in Iowa mines are the frequent use of longwall and the rare use of mules. Laboriously totaling the record, we find that 90 mines have longwall workings and 190 are worked on the room-and-pillar system. The former method of mining is used in eleven counties, well scattered over the state, and of these Appanoose is the chief, 38 mines being worked by longwall in that county and 34 having rooms and pillars.

GOB FIRES, ETC., MET WITH IN COAL MINES. By Arthur Brealey. Certificated mine manager. 55 pp., 5 1/2 x 8 1/4, 5 ill. Chronicle Printing & Publishing Co., Ltd. Leatherette boards. 1912. Price, 1s.

This pamphlet makes no great pretensions, and this fact makes us little disposed to criticize it severely. It is written in a somewhat disjointed and obscure style, does not contain anything which is at once new and true, and contains quite a few misstatements.

We miss many interesting and valuable features of gob-fire fighting. There is, for instance, no reference to the

French method of mudding coal to extinguish fires. There is no discussion as to the best method of approaching a mine fire, nor is anything said about using animals to guard against carbon-monoxide poisoning. The author has nothing to say about drowning the fire with carbonic or sulphuric dioxide.

He believes that an exhausting fan is to be avoided, because it draws gas out of the coal and says that "if a piece of coal is inclosed in a vacuum, a high temperature can be procured very quickly, thus assimilating it to coal left in the gob and inclosed in a space containing a warm atmosphere, the oxygen being used by the coal absorbing it and also by the surrounding strata producing a warm atmosphere similar to that of a vacuum." It is obvious that had we quoted this at the head of the review, no further criticism would have been necessary.

For instance, we read "Water will boil in a vacuum at 67 deg. F." After this statement, which, by the way, places the temperature too high, the author states inconsequentially that "the above facts show that any substance will burn at a very low temperature if the air pressure be sufficiently reduced." This is neither true nor apropos of anything which precedes. We are not surprised, therefore, to find that the author is capable of announcing that the expansion of the gases on the fall of the barometer "causes a rise of the temperature of the goaves."

CONSTRUCTION NEWS

Danville, Ill.—The new mine of the Bunsen Coal Co. will be located $\frac{1}{2}$ mile west of this city. The company has over 25,000 acres of land in this vicinity. Clay Lynch, formerly of the Connellsville region, is general manager.

Johnstown, Penn.—M. Sheeley & Sons, the well known contractors, have landed the contract for 1900 ft. of tunnel work and a lot of shaft work at a mine being opened by the Loyalhanna Coal Co., in Shade Township, Somerset County.

Youngstown, Ohio—The Republic Iron & Steel Co. will build a new coking plant on 15 acres purchased between the Canfield branch of the Pennsylvania R.R. and the Lake Erie & Eastern right-of-way. The plant will have a 1000-ton capacity.

Somerset, Penn.—The Quemahoning Creek Coal Co. is rushing work on a new opening at their operations at Harrison. It is expected that when this second opening has been completed the number of men as well as the output will be trebled.

Bessemer, Ala.—A large sum of money will be expended this year by the Tennessee Coal & Iron Co. in developing the mines at Potter, on Red Mountain. Several hundred miners will be employed at this mine when working with a full force and full time.

Washington, Penn.—The opening up and development of untouched coal fields of Washington and Greene Counties is forecast in the report that the Pennsylvania R.R. is at work preparing to make an extension of its lines from northern Washington County south into Greene County. It is likely that work will be begun on the new extension within a few months.

Connellsville, Penn.—The contract for the boiler house to be erected at Trotter works of the H. C. Frick Coke Co. is to be let this month. The structure is to be of brick, steel and concrete, and to have a length of 118 ft., with ends 43 and 75 ft. wide. The height is to be 35 ft.

The new structure is to be built over the old one without stopping operations in the latter.

Connellsville, Penn.—Two contracts have been awarded for new coke-oven plants in this section. One plant of 100 ovens is to be built in the Ligonier Valley, on 300 acres of upper Connellsville coal land.

The other will consist of 200 ovens, to be built near Du Bois, Penn., by the Sykesville Coke Co. The ovens are to be of the rectangular type with mechanical pushers. The plans for this plant have been completed and it is to be built this summer.

St. Louis, Mo.—According to dispatches from New York, a syndicate has been formed to build byproduct coke plants in different portions of the country. These plants are to use adjacent coals for coking them. It is proposed to build plants suitable for different localities, and no special type of oven will be used.

The concern will establish one plant at St. Louis, with an annual coal consumption of over 400,000 tons. Another,

at Newark Bay, N. J., will have an annual consumption of 200,000 tons.

Charleroi, Penn.—Contracts are to be awarded in a short time for important extensions to the little coal road owned by the Pittsburgh Coal Co., known as the Montour railroad, which will connect that road with the Bessemer & Lake Erie R.R., near Homestead. In all, 40 miles of new road will be built. Cost, \$4,000,000.

Kosmosdale, Ky.—The St. Bernard Mining Co., one of the largest of the western Kentucky operators, has just closed a five-year contract for the full supply of the Kosmos Portland Cement Co., of Kosmosdale, Ky. The company's requirements average about 3000 tons a month. A former five-year contract between the two companies has just expired.

NEW INCORPORATIONS

Cincinnati, Ohio—The C. G. Blake Coal Co.; to change its name to the C. C. Blake Co.

Arvonia, Va.—National Slate Corporation; capital stock, \$25,000; to develop slate property.

Hamilton, Ohio—The Hamilton-Otto Coke Co.; capital stock, \$700,000. Incorporators: J. C. Thomas and others.

Richmond, Va.—Maryland Coal Corporation; increased capital from \$250,000 to \$600,000 for continued development of its properties.

Spokane, Wash.—British Columbia Coal Co.; capital stock, \$500,000. Incorporators: Henry Rising, managing editor of the "Spokane Chronicle," and J. H. Tilsley.

Cambridge, Ohio—The Economic Coal Co.; capital stock, \$10,000; to deal in coal and coke. Incorporators: C. B. McCoy, J. L. Secrest, J. A. Thrasher, Homer Witten and F. W. Tobin.

Cleveland, Ohio—The Albert E. Ward Coal Co.; capital stock, \$5000; to mine and deal in coal. Incorporators: Albert E. Ward, C. V. Ward, M. W. Shetter, Fred J. Axel, and J. Stacel.

Cushing, Okla.—The W. T. Fields Oil, Gas, Coal & Investment Co.; capital stock, \$25,000. Incorporators: W. T. Fields, Guthrie; William W. Cuthbertson, El Reno and Pete Hanraty, McAlester.

Salt Lake City, Utah—Thomas Knox Coal Co.; capital stock, \$10,000; shares \$100 each. A. R. Thomas, president; Athol Rawlins, vice-president; George S. Knox, secretary and treasurer.

Fairmont, W. Va.—Milan Coal & Coke Co.; to develop coal lands in Harts Creek district, of Lincoln County, West Virginia; capital stock, \$100,000. Incorporators: Milan N. Glumlich, Julius Hoffman, Marvin L. Linn, Thomas W. Powell and Richard Hoffman, all of Fairmont, W. Va.

Clarksburg, W. Va.—Francois Coal & Coke Co.; to develop coal lands, manufacture lumber, coke, and drill for oil and gas in Harrison County, West Virginia; capital stock, \$100,000. Incorporators: V. E. Goeke, J. M. Francois, J. C. Williams, E. J. Francois and E. L. Spraker, all of Clarksburg, W. Va.

Roundup, Mont.—Articles of incorporation were filed Jan. 9 by the McCleary Coal Co., which will have a capitalization of \$500,000. V. C. McCleary is secretary. Active work will be started on a spur which will be built from the main line of the Milwaukee, up Carpenter Creek to the mine, a distance of about five miles. Work will also be started at the mine early in the spring, and they expect to be able to load 300 tons of coal daily.

INDUSTRIAL NEWS

Rivesville, W. Va.—According to reports, active preparations are being made to develop the Pittsburgh seam, along the western side of the Monongahela River.

Plains, Penn.—M. J. Healey has concluded negotiations for the transfer of his interests in the Stark holdings, recently purchased by the Madeira Hill Co., to that concern.

Fairmont, W. Va.—The National Consolidated Coal Co. will develop a large tract of coal in Barbour County, West Virginia. It is proposed to erect coke ovens and enter that trade as well.

Cleveland, Ohio—The largest purely gravity coal-handling plant in this city is now in practically complete operation at

the yards of the Cuyahoga Coal Co. The bins have a capacity of 3000 tons.

San Francisco, Calif.—The Taylor-Wharton Iron & Steel Co. announce that they have moved their Western sales office from 203 Mills Building, San Francisco, Calif., to 504 Newhouse Building, Salt Lake City, Utah.

Prescott, Iowa—An 8-in. seam of bituminous coal has been struck during the past week at a depth of 104 ft. The drillers are still going down in the hope that they will strike the second seam which they believe to be close.

Connellsville, Penn.—The mines of the Latrobe-Connellsville Coke Co., near Latrobe, are partially flooded from old workings which take surface drainage. The company has found it necessary to order a pump installed in the mine.

Morgantown, Ky.—G. L. Drury, J. A. Watkins, C. E. Sullivan and J. C. Haney, of Union County, Ky., have purchased the West Aberdeen Coal Co.'s property and are now repairing the mines with a view to putting them in operation.

Lovington, Ill.—Up to last week the Lovington mine has been taking on new men almost every day, until the entire works are now nearly full. All told, the company has now employed about 145 men. They are hoisting from 500 to 700 tons of coal a day.

Washington, Ind.—Judge Ogden has appointed John Dosch, a real-estate dealer, as receiver of the Riverside Coal Co., owning one of the largest mines in this section. The receivership was brought about by trouble existing between the miners and operators.

Pittsburg, Kan.—State Mine Inspector Leon Bessen has ordered mine No. 6 of the Dixie Coal Co. to be closed down, owing to the failure of the company to make certain alterations in the equipment. The mine is the largest in the district and employs 300 men.

Waynesburg, Penn.—E. F. Baily has just completed the sale of 1000 acres of coal located in Braxton County, West Virginia, to some Greene County business men. The sale included both the Pittsburgh and Freeport seams. The consideration has not been made public.

Whitesburg, Ky.—It is announced that an eastern syndicate has purchased the Sam J. Wright and John Osborne tracts of coal and mineral land near that city, consisting of about 1200 acres. Early development is planned, in connection with which a four-mile branch will be built.

Middlesboro, Ky.—It is reported that a company composed of West Virginia mining men has obtained control of the Mary Moore coal property in that vicinity, which has been idle for some time, and will shortly reopen the mines for operation. Ray Moss, of Middlesboro, will act as manager for the company.

Camden, Ark.—A fluid extracted from lignite coal, which is mined near here, is being successfully used for tanning purposes. The discovery was made by Dr. Geo. W. Kimball, who has offered to sell his patent to the Morris Packing Co., for \$20,000, with the stipulation that the company install a tanning plant here.

Sycamore, Kan.—A 5-ft. bed of anthracite coal has been discovered by a test drill, 7 miles from Independence. Experts declare that the coal is first class in quality. The anthracite coal was struck at a depth of 800 ft. Additional ore drills have been ordered to test the field further and ascertain its extent.

Fairmont, W. Va.—The holdings of the Southwestern Coal Co., consisting of 8000 acres of land, are to be transferred to the Excelsior-West Virginia Colliery Co., which has just been incorporated with a capital stock of \$2,000,000. The land will be developed at once. The principal offices of the company will be in this city.

Fayetteville, W. Va.—The Marsh Fork Splint & Gas Coal Co. began loading coal from their new mine, near Jarrolds Valley, a few weeks ago. They are just out of the strike zone, the men seem well satisfied and indications bid fair to make this one of the most important operations in this section of the country.

Norfolk, Va.—The Norfolk & Western has just placed an order for 40 more Mallet locomotives and 2250 cars while the Virginian is now receiving the 7000 coal cars ordered last fall and the delivery of the 2000 cars ordered by the Chesapeake & Ohio will soon begin. The ordering of the additional equipment is assurance that the railroads look for a most prosperous coal year in both domestic and export business.

St. Louis, Mo.—James Campbell, a local capitalist, and others, are reported organizing a company, with capital \$5,000,000, to build byproduct coke plants in various cities, including St. Louis. The local plant, it is proposed, shall have a capacity of 1000 tons of coal per day, with plans that will permit expansion. Everything pertaining to the proposed corporation as yet is somewhat indefinite.

Birmingham, Ala.—Between four hundred and five hundred men will be put to work Monday in the Searles mines, Tuscaloosa County. Harry Coffin, trustee of the Alabama Consolidated Coal & Iron Co., with permission of Referee in Bankruptcy Dryer, has made a contract with the Tennessee Coal, Iron & Railway Co. for 1000 tons of coal daily. The coal will be used in making coke at Corey.

Fairmont, W. Va.—Filing of 87 coal deeds with the county clerk brought a big coal deal to light recently. Eighty-six of these deeds conveyed various parcels of the Sewickley or Mapletown coal vein underlying parcels of land in Paw Paw, Lincoln and Fairmont districts to the Southwestern Coal Co. from the individual owners, and the other conveyed the tract from the Southwestern company to E. H. Thompson, of Chicago. It is said the coal would not be worked, but was bought by Mr. Thompson as an investment.

Waynesburg, Penn.—E. F. Bailey, of Cumberland Township, has just completed a sale of 1000 acres of coal, situated in Braxton County, W. Va., to a party of business men in the eastern part of the county. The coal comprises the Pittsburgh and Freeport veins. Since Greene County coal is passing into the hands of operators, the eyes of investors are being turned toward West Virginia, where coal may still be had at prices which may double themselves in a short time if the present rate of advancement is maintained.

Chicago, Ill.—The Link-Belt Co., of Philadelphia and Chicago, designers and manufacturers of coal-tipple equipments and other conveying machinery, announce that hereafter the contract work in the West Virginia and Virginia coal fields will be in charge of their engineer, F. F. Waechter, replacing A. Kauffman, who has been transferred to the Chicago plant.

Mr. Waechter has been in the company's employ for the last 15 years, having spent a great part of his time in the engineering department, where he held the position of chief draftsman. The last two years he has spent in the sales department. This combination of experience fits him admirably for his new duties in the coal field.

Pittsburgh, Penn.—Orenstein-Arthur Koppel Co., general offices, Machesney Building, Pittsburgh, Penn.; works, Koppel, Penn., advise that their general manager, A. Reiche, is now in Berlin, Germany, where the head office of this company is located, in consultation with the executive officials regarding the extensive improvements to be made during the coming year at their American plant, Koppel, Penn. It is of interest to know that the entire executive department of the American organization, which is now located in the Machesney Building, in Pittsburgh, is to be moved to their plant, at Koppel. They are having a new office building erected, which will be two stories high, and will cover a plot 100x160 ft. This shows the tendency of the larger manufacturers toward avoiding the heavy expense of the rents in cities and getting closer to their mechanical and operating departments.



Development of the telephone

The telephone, though but a bit over 37 years of age, and therefore still young, has probably developed more in that short time than any of its humanity-helping contemporaries. In fact, writers have termed the development of the telephone a "romance of science." The story of this romance has been put forward in what is perhaps the most understandable and, at the same time, the most interesting way, in the exhibit of historical and modern telephone apparatus and electrical supplies recently inaugurated at New York by the Western Electric Co. The exhibit is in three sections.

The historical section shows the development of the telephone from its earliest stages up to the present time. The smoked-glass records of sound waves, made by Alexander Graham Bell, in 1874, using the human ear as a transmitting diaphragm, and thus proving that diaphragms would transmit sound waves; parts of Bell's original telephone of 1876, mounted to make a complete model, and numerous instruments showing the gradual improvement in design, are exhibited to great advantage in large glass cabinets with placards, giving a description of each article. Included in the historical collection, which is composed partly of apparatus loaned by the American Telephone & Telegraph Co., and partly of the Western Electric apparatus, are the switchboard used by Mr. Bell in opening the New York-Chicago line in 1892, and the receivers and transmitters used at the opening of the New York-Denver line in 1911.

The modern apparatus section contains switchboards, magneto and central battery, each switchboard having wired to it a number of telephone sets, so that service demonstrations may be made to visitors.

COAL TRADE REVIEWS

GENERAL REVIEW

It is generally conceded by all that the hard-coal trade has passed the high point for the season, and is now definitely on the decline. Premium coals have almost entirely disappeared and concessions on various sizes are being freely offered. Some operators are attempting to enforce restrictions as to allotments of various sizes, but consumers are showing an independence of any such regulation on their orders. Middlemen who contracted heavily at high prices over February are being forced to sell at liberal concessions below contract prices.

There is a general slump apparent in the Eastern coast-wise trade. Shippers are pressed by cars standing in the yards, with the result that they are eager to make sales, and it is evident that there will have to be a curtailment in mining, or the trade will shortly be demoralized. Only a few contracts are being closed; prices are off, and the trade is finding it difficult to contract as buyers appear confident that quotations will ultimately reach the low level of last year. Consumers of Pittsburgh coal are, as a rule, taking full allotments on their contracts, although some are asking for curtailment in shipments; spot prices are down to the contract level, and operators are actively seeking business. The car and labor supply are sufficient to meet all requirements, but mining is only under a moderate pressure. Ordinarily, such a winter as the present one would make the marketing of coal difficult if not impossible, and Eastern dealers generally are surprised at the ease with which the heavy tonnages are being moved; however, prices are weak and uneasy, and operators are finding it difficult to contract.

The Ohio market is showing more strength but is still far from normal for this period. Domestic continues the weak feature in the market, with steam still showing a tendency to act in sympathy with it; cars are plentiful and production is down to a lower point than at any time during the season. There are some forced sales at reduced prices to avoid demurrage on speculative coal, and the general tendency is toward lower prices; however, producers are holding firm for higher quotations on contracts. Dumping at Hampton Roads is heavier than usual and close to the record, but the market is weak, due to heavy accumulations, as a result of a good car supply and warm weather. There is still a good healthy tone to steam in the Southern market, although domestic has weakened and operators are finding it difficult to dispose of their output.

An abrupt change in weather conditions has avoided what would certainly have developed into a complete demoralization of the Middle Western trade had it not appeared. Immense tonnages of unsold coal were standing on track and it is difficult to say what would have been the result had the same unseasonable weather continued. Prices still rule low, and operators are finding it difficult to contract at reasonable figures, but it is expected that the zero weather will effect a rapid change in the existing conditions. The improvement is confined mostly to domestic grades, but it is also having a stimulating effect on the steam sizes. In the Rocky Mountain region and on the Pacific Coast severe weather has been prevailing, and there were temporary fears of a coal famine, but the situation appears to be well in hand now.

BOSTON, MASS.

The slump is apparent in every direction. The shippers of the Southern coals are pressed with cars standing and so eager are they to make sales that prices are now down to the level of last summer; \$2.70 has been the current price for nearly a week, f.o.b. Hampton Roads, for Pocahontas and New River. The off-shore market seems a little better than along the coast, but there will have to be a restriction in mining or things will be demoralized. The Pennsylvania grades are off to \$2.70@2.80 f.o.b. New York, and even Georges Creek is beginning to come down freely on orders, both at Philadelphia and New York as well as at Baltimore.

A week ago there was talk of contracts, but the agencies realize now that it would be next to impossible to close a season's business at \$2.85@3 when the market is 15@25c. less than that for current shipment. Some business is rumored to have been closed, but the volume is relatively small. Buyers are confident prices will rule at least as low as last year, and

February is too early to get them interested, in view of present conditions.

The market all-rail is as dull as at tidewater. Prices for spot coal are not much in excess of \$1.25 at the mines for the ordinary grades and purchases are small and less frequent. Some of the railroads which were down to two and three days' supply several weeks ago are now apparently well stocked and there is no life to the situation. Car supply is improving, and practically all the mines are enjoying a reasonably good allotment.

Current quotations at wholesale are as follows:

Clearfields, f.o.b. mine.....	\$1.25@1.40
Clearfields, f.o.b. Philadelphia.....	2.50@ 2.65
Clearfields, f.o.b. New York.....	2.75@ 2.95
Cambrias and Somersets, f.o.b. mine.....	1.40@ 1.60
Pocahontas, New River, f.o.b. Hampton Roads.....	2.60@ 2.70
Pocahontas, New River, on cars Providence.....	3.90@ 4.10
Pocahontas, New River, on cars Boston.....	3.95@ 4.10

NEW YORK

Bituminous—A fall in temperature the last of the preceding week which continued over the first of the current one, had a somewhat steadying effect on the local market, but did not entirely check the decline which the trade has been experiencing over the last few weeks. But even though prices have fallen off, there is a slight increase in the demand and some of the operators are of the opinion that the market is in a stronger position. As a reason for this belief, they state that, owing to the high price level prevailing in the spot market over the last few weeks, shippers generally have been curtailing allotments on contracts in order to take the greatest possible advantage of the high quotations for prompt coal. Now that this demand has been partially satisfied, thus causing an easing off in prices, consumers having contracts are finding their supplies at an unusually low point.

The railroads are again beginning to appear in the market after having been out over the last two or three weeks. The heavy buying on their part has been one of the best features in the trade, this season, and the new inquiries from them will do as much to steady up the market as anything that could occur, with the possible exception of an abrupt change in weather conditions. This latter has been so entirely adverse to a heavy consumption, that it is rather remarkable that the soft-coal market has held so well as it has.

We quote the local market as follows; with bituminous prices somewhat reduced, but quite strong at the new level:

	Anthracite		Bituminous	
	Circular	Individual		
Broken*.....	\$5.00	\$4.50	West Virginia, steam.....	\$2.80
Chestnut†.....	5.50	5.45	Fair grades, Penna. . .	\$2.90@2.95
Pea*.....	2.75	\$3.75@4.10	Good grade, Penna....	2.90@3.00
Buckwheat**.....	2.75	2.25@2.70	Best miller, Penna....	3.00@3.05
Buckwheat†.....	2.50	2.00@2.40	Georges Creek.....	3.25@3.30
Rice**.....	2.25	1.80@1.95		
Rice†.....	1.95	1.50@1.65		
Barley†.....	1.75	1.20@1.70		

* Scranton and Lehigh.

** Scranton.

† Lehigh and Schuylkill.

Anthracite—While weather conditions have experienced an abrupt change locally, it has not as yet been of sufficient duration or severity to effect any difference in the hard-coal situation. The result is that prices have slumped off still further, orders are quite scarce, and the trade is at an unusually low ebb. There is some slight demand for stove and pea, and chestnut is becoming noticeably easier; egg is so plentiful, that concessions are readily obtained on it, and consumers generally are becoming particular about sizes and grades. Cancellations are coming in at a rate that is alarming the companies and new orders are almost impossible to obtain.

It is evident that the speculators stand to lose heavily the coming season. In view of the shortage of some 6,000,000 tons in production, many of these anticipated an acute famine in hard coal during the winter and contracted liberally for February tonnages at relatively high prices. Consumption has been so low, due to the unseasonable weather, that the heavy demand failed to materialize, with the result that quotations are low and the speculators will be forced to sell this high-priced product at circular or lower.

PHILADELPHIA, PENN.

A slight fall of snow, followed by a comparatively low thermometer, stimulated the retail coal market, but unfortunately, it centered on the two sizes which were already short of the current demand, that is stove and pea. During the previous week, these sizes had been slightly easier, but the cooler weather, tightened them up again. Egg and nut are in a comparatively easy supply, orders being filled with promptness, but the dealers are still short on stove and pea.

Tidewater business still continues good, and while it is understood there are some cancellations, large numbers of barges are going out weekly, consigned to down east points, although it is admitted that the trade in the east is taking as little as possible of egg size. This is used almost exclusively in large residences, and assuming that it is purchased in large quantities, the supplies now on hand, due to the unseasonable weather, have been ample so far this winter, and unless conditions change, there is likely to be a surplus of this grade until the spring or opening prices are announced. It is a fact that egg is invariably active, only when prices are the lowest, in the spring, some dealers at that time taking almost their entire requirements.

Complaints are heard that, inasmuch as the supply of coal is easier, prices should recede or be reduced. Considerable coal was brought in this city, for which the dealers paid quite handsome premiums, but it is doubtful if the householder paid any advance over the current prices. The individual operators, finding it impossible to market their egg coal at current figures, are conceding anywhere from 25 to 30c. per ton to move it, and in some cases, are breaking it down at the mines into the smaller sizes, for which there is still a ready market.

PITTSBURGH, PENN.

Bituminous—Mining is being conducted under only moderate pressure. Car supply is adequate and so is labor, while demand is less than was expected. Contract consumers are taking full shipments as a rule, but there are cases of requests for curtailment in shipments, owing to accumulation of stocks. Prompt demand is relatively light, and some of the operators are rather actively seeking such orders, though, as a rule, not at the expense of prices, which recently dropped, for prompt coal, to the contract level. In exceptional cases it is possible the contract prices have been shaded slightly on small prompt lots, but generally speaking, the market is firm. This is for mine-run and screened coal. Slack continues to command a good premium above the circular or general price for the season, 90c., and is rather readily sold at \$1.10.

There is more sounding of the market on contract coal for the year beginning Apr. 1, and some buyers evidently have hopes of breaking the regular prices, but thus far there has been practically no encouragement for this position. Regular contract prices are as follows: Slack, 90c.; nut and slack, \$1.05; nut, \$1.25; mine-run, \$1.30; $\frac{3}{4}$ -in., \$1.40; $1\frac{1}{4}$ -in., \$1.55 per ton at mine, Pittsburgh district.

Connellsville Coke—The coke market has been soft since the decline noted a week ago, and prices are quotable still lower. There has been an almost entire absence of demand for both prompt and contract coke. This has been partly the cause of the market weakening, but of equal moment has been the increased production since the celebration of the various holidays was completed. In the past three weeks the output has averaged about 425,000 tons weekly, against 400,000 tons maintained for many weeks previous. Sales of prompt furnace coke have been made in the past week at \$3.25, and while \$3.50 is asked by many operators the price seems to be entirely nominal. There has been scarcely any negotiation for contract coke, and the full measure of the decline is not disclosed, but enough is known to make it quite certain that \$3.50, formerly the minimum asking price, is entirely out of the question, and \$3.25 would doubtless be shaded for many good brands. Foundry coke has also declined, but not so markedly as regards price, the change rather being that better grades of coke can now be secured. For many weeks really standard foundry coke was out of the market. We quote: Prompt furnace, \$3.25; contract furnace, \$3.10 @ 3.20; prompt foundry, \$3.50 @ 3.75; contract foundry, \$3.25 @ 3.50, per ton at ovens.

BALTIMORE, MD.

A sharp break in prices occurred during the week, occasioned by the prolonged open weather. Operators reported sales at prices from 50c. to 60c. lower than were obtained 10 days or two weeks ago; some offered low-grade fuel as low as \$1 per ton, and found consumers were not over-anxious to enter the market even at these low quotations. The market is weaker than it has been for three or four weeks, and does not show any signs of improvement, espe-

cially in spot business. There has not been such a mild January, according to reports issued by the weather bureau, for nearly eighty years. Naturally such weather would affect the anthracite trade the most, but the bituminous dealer, too, has found the demand gradually falling off until but little or no coal is moving except on contracts.

The only activity is in contracting; one of the largest companies has closed up three contracts during the week at prices from 10c. to 15c. higher than the old quotations. It is expected that contracts will be closed spasmodically until the general renewals which will take place two months hence. There is a slight shortage of labor and some little complaint was heard of the car supply during the week, but it is not causing the trouble that it would were the demand for fuel greater.

BUFFALO, N. Y.

The anthracite shippers are agreed that the mild winter has been a good thing for them, as otherwise the demand for coal would have been so far in excess of the supply that the situation would have been acute. As it is the anthracite supply is now about up to the demand.

Ordinarily such a winter would have obliged the bituminous trade to use every possible means to sell coal at a profit. Prices are, of course, what they were a month ago, though it is difficult to quote accurately just now, as buyers and sellers are far apart. There are many rumors of coal offering at sacrifice prices, but at the same time jobbers are expressing surprise that their sales are going through so well. Even the railroads, which bought considerable high-priced coal during December, are generally taking it without grumbling. Sellers are finding it difficult to contract because of prevailing low prices. The car situation is easier than it has been for some time, as all the railroads have to contend with is some high water and landslides. Quotations are weak and unsteady on the following basis: \$2.75 for Pittsburgh select lump; \$2.65 for three-quarter; \$2.50 for mine-run and \$2.40 for slack. In some instances slack is so much stronger than sizes that it sells on a par with mine-run. The price of coke is about as formerly, being based on \$6 for best Connellsville foundry. Allegheny Valley coal is quite as strong and active as Pittsburgh, at about 25c. less.

The sellers of independent anthracite are getting little premium now, and will get none at all soon, if warm weather continues. The Buffalo retail anthracite trestles are running only about half as strong as they usually do in midwinter, and orders from outside are no longer urgent.

COLUMBUS, OHIO

While steam trade is holding up well, it is sharing in the general weakness which has taken possession of the market. Manufacturing plants are taking large tonnages, although they are not inclined to stock up for the future, only taking what is temporarily needed. There is now no complaint from a lack of cars, they being plentiful in every section and shipments are coming out promptly. The high waters, which interfered with the movement from West Virginia, have not subsided and a considerable tonnage is coming from that state.

The first day of the low temperature caused a rush of telegrams asking to start shipments on orders placed previously. Production has been lower than at any time during the winter, most of the mining districts reporting between 40 and 50 per cent. of normal. In the strictly domestic fields the production was even below those figures. In the Pomeroy Bend district most of mines have been placed in commission and a considerable output is reported. Consumers have a fair supply and unless continued winter weather comes the retail business will be slack from this time on; retail prices have weakened materially.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump.....	\$1.50	.....	\$1.65	\$1.50
$\frac{3}{4}$ -inch.....	1.35	\$1.20	1.40	1.30
Nut.....	1.50	.....	1.50	.....
Mine-run.....	1.20	1.10	1.25	1.15
Nut, pea and slack.....	1.15	.....	1.00	1.05
Coarse slack.....	1.05	1.00	1.05	0.95

CLEVELAND, OHIO

The large speculative movement of coal to this district had a tendency to reduce prices during the past week. Shippers continue to report a scarcity of orders and in many cases, unconsign coal is being held at the mines. Some operators have shipped large quantities for distribution in the city retail trade, and this has weakened the market and companies have been forced to sell their product at reduced prices to avoid demurrage.

Shippers of Pittsburgh No. 8 coal report a general curtailment of railroad fuel. Orders to discontinue shipments

temporarily were received from the Pennsylvania, Baltimore & Ohio, Lake Shore & Michigan Southern and the Ann Arbor railroads. Shippers, however, are assured of a resumption of fuel shipments as soon as the present accumulation is cleared away.

Wholesale quotations per short ton f.o.b. cars at the mines are as follows:

District.	Freight rate	4-in.lump	Mine-run	Slack
Youghiogheny.....	\$1.00	\$1.40	\$1.30	\$0.95
Pittsburgh No. 8.....	0.90	1.20	1.10	1.00
Goshen No. 6.....	0.70	1.35	1.25	1.05
Coshocton.....	0.70	1.70	1.45	1.05

Pocahontas lump and egg is quoted at \$2, run-of-mine \$1.25, and slack 90c., f.o.b. mines. Massillon \$2.50 and Hocking \$1.50 mines. Furnace coke is bringing \$3.50 f.o.b. ovens, while foundry grades are going at \$4 for spot shipment. While the prices for spot coal are below normal, shippers are quoting high prices on contract business, believing that the market will improve in the near future.

Railroad equipment is arriving with regularity especially in the Youghiogheny field; in fact, cars are too plentiful for the good of the market. Some difficulty is reported in receiving exactly the class of equipment wanted, but shippers believe this condition will gradually improve.

HAMPTON ROADS, VA.

The spot market is rather weak just now, owing to the temporary accumulation of coal at tidewater; the Virginian Railway has about 56,000 tons at its terminal today with about 45,000 tons more along the line, while the Norfolk & Western also has quite a large tonnage here and the Chesapeake & Ohio about 38,000 tons at Newport News. This accumulation of coal, caused by heavy loading at the mines, quick movement and abnormal weather conditions, has brought quotations down to \$2.90 to \$3 f.o.b. with few buyers even for the best grades.

The dumping at the piers has been heavier than usual, close to the record figures and there has been no scarcity of bottoms. During January the Norfolk & Western dumped 484,843 tons at Lamberts Point, the Virginian Railway 260,544 tons at Sewalls Point and the Chesapeake & Ohio 243,571 tons at Newport News. The week's exports of coal have shown a slight increase over the preceding week; January exports were 173,706 tons as compared with 109,325 tons in the same month last year.

Two new tidewater agencies have been established here. The United States Coal Co., a new concern, handling New River and Pocahontas coals and the Flat Top Fuel Co., operating and owning properties in the Pocahontas fields. The latter is an old company, owned by the Thomas-Cooper interests, but has not been in the tidewater market. A new sales agency has also been chartered, the West Virginia Coal Co., with headquarters at Richmond, Va. They are to handle New River and Kanawha coals, and will be a factor in tidewater business.

BIRMINGHAM, ALA.

The market on domestic coals has weakened considerably during the current week and mines producing this grade are finding it a hard task to dispose of their output; prices have eased off to some extent. The much-longed-for cold weather has not arrived and many of the dealers still have good stocks in their yards. Not much more winter is expected and it is probable that considerable domestic coal will be thrown into the steam trade during the next few weeks. Fortunately, there is a healthy demand for steam grades and any surplus is not likely to materially effect prices until well in the spring, when automatic reductions are made on all grades.

Domestic coke is less active, the market on this product being directly subject to conditions controlling the domestic coal situation.

LOUISVILLE, KY.

The first day of February brought with it the beginning of about the only really cold snap of the present winter and gave some strength to the trade. Some of the more pessimistic have taken the ground that the present cold wave, unless quite prolonged, is not likely to benefit operators to any extent. They believe that the retailers will take advantage of the stimulated demand to get rid of the stocks laid in during December and earlier, and chance the possibility of a late spring, rather than buy in any considerable quantities at this time.

Owing to the conditions outlined, the domestic market has been really no market at all. The only quotations made to the trade on high-grade Jellico and other good domestic coal, are in the neighborhood of \$2.25, with second-grades from \$1.50@2, and there have been practically no sales at these figures. Steam coal is scarce, and the market stiff. Eastern Kentucky nut and slack is quoted at 80c.@\$1; No. 2 run-of-mine, \$1@1.15, and straight run-of-mine, \$1.25.

INDIANAPOLIS, IND.

About the only change in the situation here this week is a spell of cold weather that took the temperature down around zero and greatly increased sales of domestic grades, adding also to the steam consumption. But buyers are well stocked and will not be in the market to any material extent until their piles have been reduced; mines caught up some time ago with the heavy demand of November and early December, caused by buyers trying to get all the coal possible.

Factories are busier than they have been for years, but the mild weather of the first two months of winter has resulted in a comparatively light consumption. Prices at the mines are at the summer level. Operators are making, or trying to make, contracts for next winter, the earliest in the year they have ever done this.

DETROIT, MICH.

Owing to this uncertainty, and after an investigation covering a period of about three months, which has been extended into a number of other cities, a special committee of the city's common council has submitted its report recommending the establishment of a municipal coal yard as the means of regulating the local prices on hard coal. The committee announces that in other cities, less accessible to the mining regions than Detroit, hard coal is being sold at \$7.50 per ton while local consumers have had to pay from \$8 to \$9.

It is feared that the balance of the season will continue to show an over supply of domestic coal, and that there will be no demand, in this market, for that kind of fuel.

	W.Va. Splint	Gas	Hock- ing	Cam- bridge	Pitts. No. 8	Poca- hontas	Jackson Hill
Lump.....	1.50	.....	\$1.50	.....	.....	\$2.00	\$2.25
Egg.....	1.50	.....	1.50	.....	.....	2.00	2.25
Nut.....	1.40	.....	1.50	.....	.....	.....	.....
14-in. lump.....	1.25	.....	.....	.....	.....	.....	.....
4 lump.....	1.10	\$1.10	1.10	\$1.10	\$1.10	.....	.....
Mine-run.....	1.00	1.00	1.00	1.00	1.00	1.25	.....
Slack.....	1.05	1.05	1.05	1.05	1.05	1.25	.....

CHICAGO

With the advent of zero weather, Chicago coal dealers are anticipating a change in business conditions that will bring better prices and a greater volume of sales.

There has been such a slump in the local market that a curtailment in production has been advocated on almost every hand. As a result of this, a number of mine operators in Illinois and Indiana have been planning to close down two or three days each week until conditions improve. The storage space of retail dealers has been taxed to capacity, but the forecast for continued low temperatures is expected to result in a comparatively buoyant market.

An index of recent conditions is seen in the statement that at a distributing point in northwestern Illinois a few days ago, 250 cars were awaiting reconsignment orders, with no demand for the coal. So far as anthracite is concerned, egg and chestnut are abundant. Prices of steam-lump and mine-run have weakened to some extent, but there has been some advance in screenings.

Prevailing prices in Chicago are:

	Springfield	Franklin Co.	Clinton	W. Va.
Domestic lump.....	\$2.07@2.17	\$2.45@2.55	\$2.27	3.55@3.80
Egg.....	.....	2.45@2.55	.....	.....
Steam lump.....	2.02	.....	2.17	.....
Mine-run.....	1.97	2.20@2.30	1.97	3.30@3.55
Screenings.....	1.67	1.90@2.05	1.62	.....

Coke—Connellsville and Wise County, \$6.50@6.75; by-product, egg, stove and nut, \$5.75@6; gas house, \$5.85.

MINNEAPOLIS, ST. PAUL

The long-sought-for cold spell has at last made its appearance and while it is too late in making its appearance to save prices, yet it will clean up the market in general.

The soft-coal situation remains practically the same as heretofore, much coal is in demurrage and is being sold at any old price. One case is shown of a car of the best Illinois grade of coal taken in by a city council in a southern Minnesota town for the freight and railroad charges, but when the books were balanced they showed the shipper owed the buyer \$8.

ST. LOUIS, MO.

The cold wave helped local conditions considerably. If this had not occurred to move the coal, it is hard to say what would have become of the hundreds of cars at the different points. At the different railroad centers in the South and in Illinois, Iowa and Missouri, it is estimated there were between 3000 and 5000 cars, of unsold coal, and because of this, there has been practically no market, as a general thing. It has been a case of everybody trying to get as much as

they could, but taking what they were offered. This applies to the high-grade field, both Franklin County and Carterville, with the former in perhaps a more precarious condition than the latter.

In the Mount Olive district prices are being maintained by curtailing the output and keeping the mines working on a short schedule. In the Standard field coal has been going for less than the cost of production, and many mines have shut down until the market gets better. As a rule, the selling price in all districts has been below the cost of production, and in many instances mines have suspended operations, except in the Standard field. The present cold wave, if it lasts long enough, may bring about a condition that will enable these operations to start up within a few days.

In anthracite, chestnut is still scarce, but the other sizes are moving freely, and as a matter of fact, are coming in too fast. Smokeless business is just holding its own at the present time, and the demand for coke is exceedingly good, ranging from \$5.25 to \$5.50 on the better grades of gas house and byproduct.

OGDEN, UTAH

The car shortage and congestion that has prevailed on the Denver & Rio Grande railroad has been somewhat relieved, although traffic conditions are far from normal. The mines in Utah tributary to the Rio Grande have suffered greatly, and at present are not able to work full time, due to the shortage. In Wyoming the Union Pacific is able to furnish sufficient cars to keep the mines running full time. Box cars are scarce and a large percentage of the commercial coal must be loaded in open equipment; again the railroad places instructions that certain cars must go East or West.

In the Northwest there are no large stocks of coal on hand and shipments during February should continue normal, providing the usual weather conditions prevail.

Both Utah and Wyoming prices continue strong as follows: Lump, \$2.75; nut, \$2.25; mine-run, \$1.85. Wyoming slack brings \$1, with Utah 25c. higher.

PORTLAND, ORE.

After two weeks of cold weather the temperature is again higher through all parts of the Pacific Northwest and the worst of winter is believed to be over. A great deal of snow fell during January in the mountainous sections and in many instances traffic was badly crippled. The Great Northern and Northern Pacific lines through the Cascades, have been more or less tied up for the greater part of three weeks, but on the Columbia River, out of Portland, they have been open as usual. There has been no advance in coal prices this winter and there is little probability of any now. The volume of business has been fair.

SAN FRANCISCO

For the past month there has been an exceptional cold snap, and the supply of coal in wholesale yards is practically nil. Owing to large bunkering engagements in the north there is but little Wellington available for this market; in fact, the deliveries of this coal here were only 24,537 tons in the past four months. Tonnage en route from Australia is small, probably not to exceed 12,000 tons for arrival during the next three months. There is one steamer cargo of Japanese house coal on the way, due to arrive the end of this month, and it will be much needed when it comes in.

Whilst nominally rates remain unchanged, in many cases dealers are charging consumers \$13 in place of \$12, the regular price.

PRODUCTION AND TRANSPORTATION STATISTICS

Pennsylvania Railroad

Statement of coal and coke carried on the P. R.R. Co.'s lines east of Pittsburgh and Erie during December and the 12 months, with the increase or decrease over the same period last year, in short tons:

	December	Difference	12 Months	Difference
Anthracite.....	1,036,717	- 178,088	10,312,348	-1,644,801
Bituminous.....	4,271,702	+ 290,216	46,434,187	+ 4,014,742
Coke.....	1,242,882	+ 331,911	13,371,345	+ 2,732,238
Total.....	6,551,301	+ 444,039	70,117,880	+ 5,102,179

Baltimore & Ohio R.R.

Coal tonnage moved over the B. & O. R.R. and affiliated lines during December, 1912, was 2,648,429, as compared with

2,468,943 for December, 1911; coke tonnages for same periods were 416,296 and 313,821, respectively, making gross of 3,064,725 tons in 1912 as compared with 2,782,764 in 1911.

CONNELLVILLE COKE

The "Courier" reports production and shipments in the Connellsville region for the week ended Feb. 1, as follows:

Production (tons)	Week	5 weeks	Shipments (cars)	Week	5 weeks
Connellsville.....	233,550	1,237,225	Pittsburgh.....	4,445	21,767
Lower Connellsville	189,203	931,503	W. of Pittsburgh.....	7,136	34,484
			E. of Region.....	901	4,483
Total.....	422,753	2,168,728	Total.....	12,482	60,734
Same period 1912..	360,153	1,755,273	Same period 1912..	10,623	51,543

NORFOLK & WESTERN RY.

The following is a statement of tonnages shipped over this road from mines in West Virginia and the commercial and company coal, for the month of December, in short tons:

Field	Shipped	Tipple	Total	Commercial	Company
Pocahontas.....	1,038,432	17,364	1,055,796	993,357	121,246
Tug River.....	167,355	3,824	171,179	137,786	33,393
Thacker.....	222,188	6,979	229,167	165,923	63,244
Kenova.....	71,032	886	71,118	65,025	6,093
Clinch Valley.....				104,531	6,890
	1,499,007	28,253	1,527,260	1,466,622	230,866

Shipments of coke, entirely from the Pocahontas field, were 100,848.

Norfolk & Western Ry.

The following is a comparative statement of the coal and coke shipments over the lines of the N. & W. Ry. for the month of December and the 12 months of the years 1911-12, in short tons:

Destination	December 1911	December 1912	12 Months 1911	12 Months 1912
Coal				
Tidewater, foreign.....	101,118	84,083	995,400	1,343,311
Tidewater, coastwise.....	293,850	258,216	3,084,674	3,583,283
Domestic.....	1,413,644	1,355,189	15,363,913	17,716,575
Coke				
Tidewater, foreign.....	5,713		75,867	52,762
Domestic.....	116,988	134,763	1,434,985	1,416,856
Total.....	1,931,313	1,832,251	20,954,839	24,112,787

LAKE COAL SHIPMENTS

Coal passing through Sault Ste. Marie Canals for the full season of navigation was, in short tons:

	1911	1912	Changes
Anthracite.....	2,060,209	2,142,485	+82,276
Bituminous.....	13,272,667	12,789,109	-483,557
Total.....	15,332,876	14,931,594	-401,282

Total shipments of coal from Lake Erie ports for the Lake trade and steamship consumption for three seasons past, in short tons:

	1910	1911	1912
Pittsburgh district.....	11,911,900	10,611,941	11,300,000
Ohio.....	4,297,300	4,019,544	4,676,000
West Virginia.....	6,629,500	7,151,200	7,360,000
Total.....	22,838,700	21,782,685	23,336,000

In 1912 the Pittsburgh district furnished 48.4%; Ohio, 20%, and West Virginia, 31.6% of the total.

VIRGINIAN RAILWAY

The total shipments of coal over this road for December of 1912 were 317,405 net tons, as compared with 316,504 for the month previous.

FOREIGN MARKETS

GREAT BRITAIN

Jan. 24—Market conditions show irregularity for prompt shipment, on account of delay to tonnage caused by stormy weather. Colliery owners appear to be heavily booked "on paper," and for forward shipments quotations are steadily up-held:

Best Welsh steam.....	\$4.56	Best Monmouthshires.....	\$4.20
Best seconds.....	4.32	Seconds.....	4.08
Seconds.....	4.32	Best Cardiff smalls.....	3.60
Best dry coals.....	4.62	Seconds.....	3.36

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days—less 2½%.

FINANCIAL DEPARTMENT

The Four States Coal and Coke Co.

At a special meeting of the stockholders, held on Jan. 18, the preferred stock of the company was increased from \$1,500,000 to \$2,500,000 of which increase \$250,000 is to be issued at once for additional working capital. The company has been organized slightly over two years, and for the year ending June 30, 1912, is eleventh in production in the state of West Virginia, and at the present rate of production will be fifth during the coming year.

It is the judgment of the management that by the installation of two additional plants the earnings will be at least 15%, based on the present selling price of coal and the average cost for the past two years. As of May 1, 1913, after deducting all operating and fixed charges, the earnings are estimated at 6% on the preferred stock and about 7% on the common.

Reports have recently been made on the properties of the company by Dr. I. C. White, State Geologist of West Virginia, and W. H. Coverdale, Consulting Engineer, of No. 66 Broadway, New York City. Mr. Coverdale's report reads in part as follows:

The Four States Coal & Coke Company owns 37,000 acres of coal seams, of which 6110 acres of low sulphur Pittsburgh coal are located in Marion County, West Virginia and on which are located the Annabelle mines.

Annabelle is a shaft mine operated by air with a past life of only two years, as it was opened late in 1910. It produced 189,579 net tons during the year ending June 30, 1911, and 390,521 tons during the year ending June 30, 1912. This mine is now developed to the point where it can produce its normal tonnage of 750,000 tons.

Dorothy and Sarita are drift mines, electrically operated. Dorothy has been shipping coal for six years, and Sarita for three. Together, they produced about 300,000 tons during the year ending June 30, 1910; about 578,000 tons for 1911, and 534,819 tons in 1912.

After the additional preferred stock referred to shall be issued, balance sheet of the company, which follows, will be in all other respects as per report of certified public accountant under date of Oct. 31, 1912.

Assets:			
Cash in banks and at works.....		\$300,748	
Accounts receivable.....		118,733	
Supplies on hand and coal not billed.....		31,794	
Development and equipment of mines:			
Annabelle.....	\$1,061,716		
Dorothy.....	385,488		
Sarita.....	341,473		
Marshall No. 1 and 2 Dev.....	763	\$1,789,442	
Houses, Annabelle.....	209,254		
Dorothy.....	84,425		
Sarita.....	56,203	349,883	
Coal Lands.....	7,110,711		
Surface lands.....	919,702	8,030,413	
Stocks and securities in other companies		25,000	
Amount advanced to B. & O. to build R.R.....		62,280	
Total assets.....			\$10,708,296
Liabilities:			
Accounts payable and pay rolls.....	\$ 163,720		
Due to Big Supply Company.....	39,867		
Due to U. S. Sewer Pipe Co.....	2,000		
Bills payable.....	99,299		
Bonds.....	3,500,000	\$3,804,888	
Interest and taxes prov. fund.....	55,815		
Insurance.....	764		
Sinking fund.....	71,446	\$128,025	
Total liabilities.....			\$3,932,914
Assets in excess of liabilities.....			\$6,775,382
Capital stock, preferred.....	\$1,750,000		
Capital stock, common.....	5,000,000		
General profit and loss, less dividends paid.....	25,382		

Dr. I. C. White estimates the value of the Four States property to be at least \$9,125,760; and sound value after full depreciation is charged off to date may be taken as \$10,185,669.

By setting aside 5c. per ton for a sinking fund, it will re-

turn to the investors the total amount of the bonds, preferred stock and common stock, when 70% of the present coal is mined out and the total investment returned to the stockholders. The remaining 30% left unmined will be worth much more than the total value of the property at the present time, on account of the increase in value of coal lands from time to time.

SUMMARY OF ACREAGE, TONNAGE AND VALUES

	Acres Coal	Acres Surface	Available Tonnage	Total Value Including Equipment
Annabelle Mines,				
Pittsburg.....	6,109.975	666.279	62,264,922	
Sewickley.....	249.730		2,356,192	
Dorothy and Sarita Mines..	31,454.000	86.455	194,279,451	\$9,125,760
Totals.....	37,813.705	752.734	258,900,565	

For the period of twenty-two months from Oct. 1, 1910 to July 31, 1912, profits after deducting administrative expense, taxes and sinking fund show as follows:

	Net Profits
Nine months ending June 30, 1911 (Production 409,830 tons).....	\$118,836.51
Thirteen months ending July 31, 1912 (Production 955,376 tons).....	257,715.84

Total production for twenty-two months

1,365,206 tons

Average net profit per ton 28 cents equal to....

\$376,552.35

The average net price received for coal in December, 1912 is 0.1386c. per ton in excess of the price for twenty-two months which increase, based upon the same cost of production as in the twenty-two months referred to with mines in full operation and producing their normal output of 1,500,000 tons per annum would show a profit as follows:

1,500,000 tons @ \$0.4186.....	\$627,900.00
Less:	
Interest on bonds issued.....	\$182,500.00
Dividend on preferred stock.....	105,000.00
	287,500.00
Estimated net profit after paying interest on bonds and dividends on preferred stock.....	\$340,400.00

COAL SECURITIES

The following table gives the range of various active coal securities and dividends paid during the week ending Feb. 1:

Stocks	Week's Range			Year's Range	
	High	Low	Last	High	Low
American Coal Products.....	90	90	90	.....	.....
American Coal Products Pref.....	111	111	111	.....	.....
Colorado Fuel & Iron.....	40 1/2	34 1/2	40 1/2	40 1/2	31
Colorado Fuel & Iron Pref.....	155	151	155	155	150
Consolidation Coal of Maryland.....	102 1/2	102 1/2	102 1/2	102 1/2	102 1/2
Island Creek Coal Pref.....	86	85	85	.....	.....
Lehigh Valley Coal Sales.....	240	204	204	.....	.....
Pittsburgh Coal.....	23 1/2	22	23 1/2	24 1/2	21 1/2
Pittsburgh Coal Pref.....	92 1/2	89 1/2	97 1/2	95	87
Pond Creek.....	26 1/2	24 1/2	25	28 1/2	24 1/2
Reading.....	166 1/2	162 1/2	165 1/2	168 1/2	160 1/2
Reading 1st Pref.....	91 1/2	90 1/2	90 1/2	91 1/2	90
Reading 2nd Pref.....	92	92	92	93 1/2	91
Virginia Iron, Coal & Coke.....	54	52 1/2	54	54	52
Bonds	Closing Bid Asked		Week's Range or Last Sale	Year's Range	
Colo. F. & I. gen. s.f.g. 5s.....	99	101	98 Jan. '13	98	98
Colo. F. & I. gen. 6s.....	107 1/2		107 1/2 June '12	.....	.....
Col. Ind. 1st & coll. 5s. gu.....	84	Sale	83 1/2 84	83 1/2	84
Cons. Ind. Coal Me. 1s 5s.....	.....	.....	85 June '11	.....	.....
Cons. Coal 1st and ref. 5s.....	.....	94	93 Oct. '12	.....	.....
Gr. Riv. Coal & C. 1st g 6s.....	94	100	102 1/2 Apr. '06	.....	.....
K. & H. C. & C. 1st s f g 5s.....	.....	.....	98 Jan. '13	98	98
Pocah. Con. Coll. 1st s f 5s.....	87 1/2	85	87 1/2 Jan. '13	87 1/2	87 1/2
St. L. Rky. Mt. & Pac. 1st 5s.....	77 1/2	Sale	77 1/2 77 1/2	77 1/2	80
Tenn. Coal gen. 5s.....	102	103	103 103	102 1/2	103
Birm. Div. 1st consol. 6s.....	102 1/2	102 1/2	103 Jan. '13	103	103
Tenn. Div. 1st g 6s.....	101 1/2	103 1/2	101 1/2 Dec. '12	.....	.....
Cah. C. M. Co. 1st g 6s.....	.....	.....	110 Jan. '09	.....	.....
Utah Fuel 1st g 5s.....	.....	.....	.....	.....	.....
Victor Fuel 1st s f 5s.....	79 1/2	84	85 1/2 Oct. '12	.....	.....
Va. I. Coal & Coke 1st g 5s.....	97 1/2	Sale	97 1/2 97 1/2	96 1/2	97 1/2

Lehigh Coal & Navigation Co.—Regular quarterly No. 137 of \$1, payable Feb. 28 to holders of record Jan. 31.

PRICES OF MINING SUPPLIES

THE MARKET IN GENERAL

The edge of the boom is off. This does not mean that business conditions are deplorable or anything of the kind, but it does mean that, while trade was booming in October, November and December and merchants were competing with one another in placing their orders with jobbers and manufacturers, they have now settled down to a regular rate of business. Every manufacturer in the country, practically, has as much business as he can do, and orders on his books for months ahead, but new orders since the first of the year have come in rather slowly. This is by no means unusual. January is generally considered to be an excellent time for inventory, and many large concerns are taking stock and making preparations for another year's business.

Fundamental conditions appear to be unusually sound. There are numerous investigations going on in federal, state and municipal government. In fact, there seems to be an epidemic of them, and while some facts are brought out that are not at all to the liking of the projectors, still to the country at large it is doing a great deal of good. There are, however, not as many unsavory disclosures being made as was the case during the life insurance investigation in 1905 and 1906, which was followed by several years of depression. The open winter that has permitted outside construction work has aided some lines of trade, but for winter specialties there has been a decided lack of orders.

The steel market is steady and firm without any advances compared with last month, few orders being placed yet, with numerous contracts on the books of manufacturers.

Railways continue to plan large expenditures during the year, and the amount of money paid out in developments would be larger if it were possible to sell bond issues at more advantageous terms. Perhaps this method of doing things will be better in the end, for the Southern Ry. has just spent for improvements, out of surplus earnings, the sum of \$5,000,000, and the Pennsylvania Line will probably spend about \$16,000,000 for new freight equipment. Most pressing of all the needs of the railways are new yards at strategic points and large terminals at all points. The necessity for these will grow rather than diminish, and the demand seems to increase in all proportions to the amount of traffic.

LABOR

An important advance in wages was made by the Interborough Rapid Transit Co. of New York, which followed the advance made last month by the Public Service Ry. which operates in Newark, and in addition, the New York Operating Co. established a company store where employees may secure food, provisions, and other necessities at considerably lower prices than at ordinary stores in the city.

There is a very good demand for miners in Pennsylvania and West Virginia, and agencies for the most part are able to supply this demand at about \$2.85 per day with transportation paid to New York by the employing company. Surface laborers when obtained from New York agencies are paid \$1.80 per day and the same rate is demanded for other rough laborers.

Firemen on the railways now have grievances, and the Brotherhood of Local Firemen is now taking a vote regarding a strike. Both the employers and employees express themselves as willing to submit to arbitration, but differ over the form of arbitration being made.

Immigration has not shown up in the expected volume, and unless immigrants come into the country more rapidly in the next two months than they have, present indications show that there will be a dearth of labor this summer.

The new scale of wages announced by the Carnegie Steel Co. calls for a payment of 17½c. per hr. to common laborers in Allegheny County, Penn.

IRON AND STEEL PRODUCTS

A diminution in the volume of orders received by mills and selling agencies since the first of the year has been almost universally reported. No strenuous efforts have been made to book a large amount of business, but there is a noticeable hesitancy among men of large affairs to place orders for future delivery. As far as present contracts are concerned, there is no uneasiness, for all of the mills have as much work as they can do for three months to come, at least, and many of them have sold up until August.

Railway buying is of fair volume, and a recent inquiry sent out by the Pennsylvania R.R. for 16,000 cars indicates the confidence of this corporation in the continuance of this present era of prosperity. Other railroads have purchased freely, not only of cars but of rails, and these consumers have been the real mainstay of the market.

Building operations all over the country are not as active as it was hoped, and while the amount of building in 1912 aggregated a fair total, in New York, in particular, the outlook is not especially bright; for one reason, funds are not available for large operations, and furthermore building operations seem to have gone forward on too generous a scale for several years. This latter, however, is an opinion held by only a part of the community, while others firmly believe that building operations in the last few years have been on a very much restricted plan, and in the near future a marked expansion will take place.

The demand for scrap iron and steel is no better, and the amount of old material coming on the market is large. Prices are low, compared with quotations for iron, and this is especially disturbing, as many believe the scrap market is the most valuable index to the iron situation.

Steel Rails—New orders have been few. Some of the Western roads are inquiring for a large tonnage later in the year, but these cannot be taken by any of the Western mills and it is doubtful if the Eastern mills can make deliveries before July. Southern mills are shipping direct, and will do so for at least four months to come. The demand for standard sections has been very light and no large orders, either for domestic or foreign business, are reported.

Quotations continue unchanged as follows: Standard sections, 50 to 100 lb. per yd., 1.25c. per lb.; 40 to 50 lb., 1.21c.; 12 lb., 1.25c. Relaying rails in Chicago of standard sections are held at \$24 per ton.

Track Supplies—The railroads in the West are specifying heavily on old contracts for all classes of track fastenings, and much work has gone forward by the railroads during the winter which would ordinarily be postponed until spring. This results in a scarcity of fastenings at mills, and quite a little delay is experienced in securing shipments. In Pittsburgh track bolts with square nuts are held at 2.05c., and splice bars at 1.50c. per lb.; spikes at 1.90c. for very large lots and spikes of large size. There has been a particularly active demand for small spikes, and these are sold as high as 2.25@2.40c. per lb. In Chicago, angle bars and splice bars are 1.50c.; track bolts with square nuts, 2.40@2.50c.; tie plates, \$32@35 per net ton.

Structural Materials—Mills rolling structural shapes have had a large volume of business from the railroads, which was made up of plates and all kinds of shapes and some bridge work. The demand for cars has, of course, stimulated the inquiry for plates, and in addition there is a good deal of interest in the market for plates for shipbuilding work, and some large aqueduct work is prospected, which may, later in the year, call for a good tonnage of this material. The biggest piece of work in sight for the structural mill is the New York Subway, the interest in which was revived late in the month when there were reports that contracts would be signed. If these contracts go through, it will mean a great deal of structural work in New York City, and stimulate some business on the outskirts, which otherwise would not take place for several months. Structural shapes in Pittsburgh are 1.50 to 1.55c. for future delivery, and 1.75c. for prompt. In Chicago, quotations for future can be had at 1.68 to 1.78c., while prompt commands 1.88 to 1.93c. Plates are held at 1.55 to 1.60c. in Pittsburgh for future delivery, and 1.75 to 1.80c. for fairly prompt shipment. In Chicago, plates are 1.68 to 1.73c. for future shipment, and 1.88 to 1.93c. for fairly prompt shipment.

Pipe—This is practically the only line in which business booked during January shows an excess over that for December. All the mills in and around the Pittsburgh district report phenomenally heavy business. There is one inquiry in the market for 180 miles of 12-in. pipe, and the leading fuel company in Pittsburgh has sent out an inquiry for over 8000 tons of tubing and casing. New discounts on pipe are firmly held, and the demand for small sizes, particularly those formerly known as merchant sizes, is excellent. Discounts are as follows: Steel pipe, ½-in., large lots from mill, black, 77%

from list; galvanized, 66½%; ¾- to 3-in., black, 80%; galvanized, 71½%; 2½- to 6-in. black, 79%; galvanized, 70½%. Based on these discounts, the net prices of pipe per foot are as follows in carload lots Pittsburgh:

Size, inches	Cents	
	Black	Galvanized
¾	2.30	3.40
1	3.40	4.85
1¼	4.60	6.55
1½	5.50	7.70
2	7.40	10.30
2½	11.50	16.70
3	15.40	21.75

Sheets—The leading interest making black and galvanized sheets has advanced its quotation \$2 per ton, and the new prices which are established are the maximum of the prices demanded for prompt shipment from independent sources for the last few weeks. Even at the higher prices, mills are securing some fairly good orders, and the sheet trade is more active than any other branch of the steel industry, with the exception of pipe. Not so much complaint is heard regarding deliveries, but makers are still from 12 to 16 weeks behind on their orders, and this will increase rather than diminish, for the sheet trade opens in the spring, and large orders placed during the winter are heavily specified against at that time.

The following table gives the price of sheets in Pittsburgh and also the price of small lots from store in Chicago:

	Cents per pound			
	Pittsburgh		Chicago	
	Black	Galv.	Black	Galv.
Nos. 22 to 24	2.20	2.90	2.66	3.60
Nos. 25 and 26	2.25	3.10	2.70	3.65
No. 27	2.20	3.25	2.75	3.90
No. 28	2.25	3.40	2.90	4.15

WIRE PRODUCTS

Wire—Painted barb wire in large lots Pittsburgh is \$1.75. and galvanized \$2.15. Annealed fence wire in carload and larger lots is sold in Pittsburgh at \$1.55, and galvanized at \$1.05. In Chicago, annealed fence wire is \$1.73; galvanized, \$2.13. The supply of woven wire fencing is not at all large, and the mills are rushed to keep up with their specifications. Barbed wire in Chicago is \$1.93 base, and galvanized, \$2.33. All of these prices are per 100 lb.

Wire Rope—Net prices of the sizes in most general use are quoted f.o.b. Pittsburgh; 2 in., 57¢@76¢. per ft., 1¼ in., 23¢@32¢. per ft.; ¾ in., 10¢@13¢. per ft. All of these prices are for large lots.

Telegraph Wire—The demand for telegraph wire has been large. For lots in fair size, the wire measured in Birmingham wire gage, prices are as follows: "Extra Size Best," Nos. 6 to 9 4½¢; Nos. 10 and 11, 4½¢; No. 12, 4½¢; No. 14, 5½¢; "Best Best," Nos. 6 to 9, 3½¢; Nos. 10 and 11, 3½¢; No. 12, 3½¢; No. 14, 4¢. Actual freight is allowed from basic points where it does not exceed 25¢. per 100 pounds.

Copper Wire—The condition of the copper market is unsatisfactory to the holders of metal, and prices have declined within the last month. Copper wire which was sold at 18½¢. per lb. a month ago can now be had at 17½¢. Even at this concession, there is little or no demand.

MINE SUPPLIES

Bar Iron and Steel—Jobbers in New York and Chicago are demanding from \$1@2 more a ton for refined iron and steel. The consumption is unusually large.

Quotations from jobbers' store, either New York or Chicago, are as follows:

Refined iron:	Per lb
1 to 1½ in., round and square	2.15¢.
1½ to 4 in. x ½ to 1 in.	2.15¢.
1½ to 4 in. x ½ in. to — in.	2.35¢.
Norway bars	3.60¢.
Soft steel:	
1 to 3 in., round and square	2.10¢.
1 to 6 in. x ½ to 1 in.	2.10¢.
1 to 6 in. x ½ and — in.	2.25¢.
Rods—½ and — in.	2.20¢.
Bands—1½ to 6x— in. to No. 8	2.40¢.
Beams and channels—3 to 15 in.	2.25¢.

Nails—The demand is fair, and the fact that prices advanced means that most of the orders for the time being have been taken. Consumers will not order from the mills, and are permitting their present stocks to run down. The minimum price to largest trade, in carload lots and over, is \$1.75 Pittsburgh. In Chicago, carload lots to retailers are 1.98; less than carload lots, \$2.03. In New York, wire nails from store are \$2.05 per keg base. Cut nails are quoted at \$1.70@1.75 in Pittsburgh and \$2.05 New York. These prices are per 100 lb.

Packing—The demand for packing has been only fair, and while prices are high, there seems to be plenty of stock at the following unchanged quotations: Asbestos wick and rope, 13¢. per lb.; sheet rubber, 11¢@13¢.; pure gum rubber, 40¢@45¢.; red sheet packing, 40¢@50¢.; cotton packing, 16¢@25¢.; jute, 5¢@6¢.; Russian packing, 9¢@10¢.

Brattice Cloth—Agents selling brattice cloth are unable to secure a stock in their warehouses, and mining companies are buying more freely, although they feel that present prices are too high. This is denied by those in close touch with the situation who point out that the world wide demand for all kinds of hemp products is phenomenal, and besides if there were anything artificial in the situation, it would have shown itself long before this in increased stocks, as prices have been high for at least eight months. Some buyers are purchasing more freely, not only because they have to, but for the reason that they think no lower prices will rule for some time, and there may be some difficulty in securing supplies.

Chain—Stocks of chain are not at all large, and consumers are buying freely. Prevailing prices are not high considering the rapid advance in the price of other steel products. Prevailing quotations per 100 lb., f.o.b. Pittsburgh, are as follows:

— in.	\$7.50
½ in.	4.95
¾ in.	3.95
1 in.	3.40
1¼ in.	3.20
and — in.	3.00
and — in.	2.90
and — in.	2.80
and — in.	2.70
1 to 1¼ in.	2.60

Extras for BB

— in.	1.50
½ in.	1.50
¾ in. and larger	1.25

Extras for BBB

— and ½ in.	2c.
— and larger	1.75c.

CONCRETE AGGREGATES

Portland Cement—Manufacturers of Portland cement are much pleased with the situation, prices are firm, and no concessions are made from the existing level of \$1.30 per bbl. at the mill. This corresponds to a price of \$1.58 in New York and Pittsburgh, with an allowance of 40¢. for bags returned when shipped in cloth bags, or no allowance when wooden bbl. are used. Stocks at the mills are exceptionally small, probably smaller than any time since 1903, when there was a marked shortage of cement. Few of the mills are getting any large portion of the increase in price, and, in fact, most of them are tied up with long-time contracts which run well into February. By early summer, however, all of these old contracts will have been filled, and the mills will commence to make all shipments on the basis of 90¢. per bbl. in bulk.

Bars, Concrete Reinforcing—Shipments are being made a little more freely, and there is a larger stock at the warehouses. Contractors, however, have been able to use concrete most of the winter, and the supply has not increased as rapidly as was hoped.

Quotations are \$1 per ton higher as follows:

PITTSBURGH PRICES IN CENTS PER POUND

	Mill Shipments	Warehouse Stock
— in. and large	1.50¢@1.55	2.00¢@2.10
½ in.	1.55¢@2.15	2.05¢@2.15
¾ in.	1.60¢@1.70	2.10¢@2.20
1 in.	1.70¢@1.80	2.25¢@2.35

Triangular Mesh—Makers of this material report a very good volume of business, considering the winter months, and, moreover, the fact that they can make shipments promptly has aided them to a marked degree.

From mill in De Kalb, Ill., quotations are 18¢. per 100 lb. higher. Prices are as follows per 100 sq.ft., f.o.b. Pittsburgh district, for less than carload lots and lots of more than 10,000 sq.ft.:

No. 4	\$1.23	No. 32	\$2.62
No. 23	2.05	No. 36	1.05
No. 26	1.42	No. 40	3.25
No. 28	1.97	No. 41	2.48

MISCELLANEOUS

Kentucky Mule Market—Reports from Louisville, Ky., and Nashville, Tenn., are to the effect that prices of mules continue high, good mules bringing from \$175 to \$180 and some very good stock has been disposed of at considerably higher figures. Matched and mated teams sell at around \$500. Most sales have been exceptionally well attended, and practically all of the offerings have been cleaned up. The farmers of southern Kentucky who are raising mules are being paid anywhere from \$110 to \$160, but at the low figures, farmers are quietly dropping out of the market, and refusing to make sales.

Castings, Gray Iron—Foundries are making more of an effort to secure orders than they were a month ago, and prices are somewhat cheaper on particularly large orders. For the general run of orders, however, quotations are established as follows: Building castings, 1.75¢@2.25¢. per lb.; rough castings, such as are used for footings, manhole covers, and similar work, 1.75¢@2c. per lb.; castings for machinery, lock gates and similar work, 2½¢@4c. per lb., depending on the size of the order and the intricacy of the pattern.